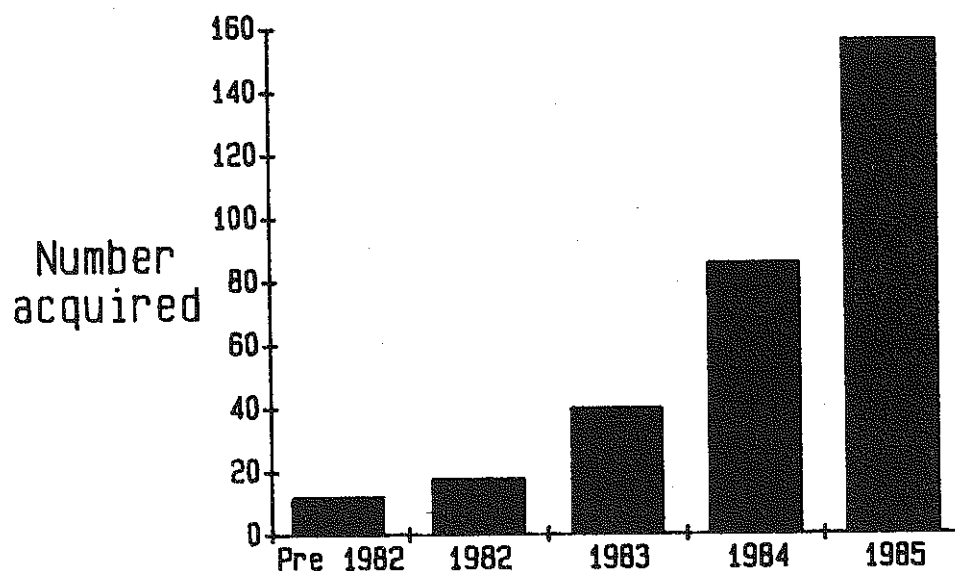


MICROCOMPUTERS AND NEW YORK TOWNS: A SURVEY REPORT



by

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ACKNOWLEDGEMENTS

A number of persons and organizations made significant contributions to the town microcomputer use survey and the preparation of this report and therefore deserve mention here.

Between 700 and 800 town officials took time to complete and return one or both of the survey questionnaires. Without their cooperation, there would, of course, be no results to report.

The New York State Supervisors and County Legislators' Association helped with the initial mailing of the short-form survey and also lent its good name to this effort. Patricia Walsh, Executive Director of the association at that time, provided a mailing list of town supervisors that was used for the initial mailing, authored one of the cover letters on the association's stationery for the short-form survey, and helped prepare the materials to be mailed. In addition, the association provided \$130 to help pay the costs of postage for the first mailing.

On behalf of the Community Issues Program of Cornell Cooperative Extension, Assistant Director of Cooperative Extension Sidney Cleveland provided \$500 to be used for postage and the printing of the questionnaires to back up his strong verbal encouragement of the survey effort.

Bruce Brower, former Senior Extension Associate in the Department of Rural Sociology at Cornell University, made an immense contribution to the survey effort. He played a major role in conceptualizing the survey process, drafting the questionnaires, organizing the survey databases, interpreting the responses for coding, and generating summary data from the survey responses. His considerable knowledge of both survey methodology and computer technology and use, his efficient and orderly work habits, and his tremendous energy and enthusiasm were major assets for the project throughout his association with it.

Mike Hattery, Local Government Research Support Specialist with the Department of Agricultural Economics at Cornell, provided significant assistance at various times. He helped conceptualize the survey process, reviewed drafts of the survey questionnaires, and provided data on towns from databases with which he was working that helped with the recording and analysis of the survey responses. He contributed numerous hours to generating a summary printout of the long-form responses and provided useful advice concerning the figures and analysis

presented here. He also reviewed a draft of this report. At times he made his contributions to this project despite heavy pressures on his time from other projects.

Thomas Bodden, Senior Local Government Advisor with the New York State Commission on Tug Hill at the outset of the project, helped with it as part of his work to complete a graduate degree as well as to pursue his strong interest in the topic of microcomputer use by small local governments. He conducted a literature review on the topic of the survey, reviewed drafts of the questionnaires and accompanying cover letters, and identified village officials who were asked to participate in a field test of the questionnaires. He also gathered data by telephone from officials of a random sample of the towns that did not respond to the short-form survey that indicated that microcomputer use among these towns was similar to that among the responding towns. Mr. Bodden also reviewed a draft of this report.

The papers that Mr. Bodden wrote on the basis of the survey data may prove useful for the development of additional projects to help New York State local governments make more and better use of microcomputers.

A number of persons in addition to those mentioned above reviewed or field-tested drafts of the survey questionnaires and provided valuable reactions that helped improve them. These persons included Stuart Bretschneider, Assistant Professor of Public Administration at the Maxwell School of Syracuse University and faculty advisor to Thomas Bodden; Diann Davisson, Clerk-Treasurer of the Village of New Berlin; William Maddock, former Clerk of the Village of Newark; Joseph Schroeder, Clerk-Treasurer of the Village of Nissequoque; Edwin Shuttleworth, III, former Village Administrator of the Village of Quogue; and Linda Weir, Clerk of the Village of Carthage.

A number of persons provided the clerical assistance that was essential to the completion of this endeavor. The word processing of the various drafts of the survey instruments was done by Florence Blodgett, Secretary in the Department of Agricultural Economics. Mrs. Blodgett and Amy Chapaitis, work-study student in the Department of Rural Sociology at Cornell, helped prepare the various survey mailings. The entry of the survey responses into the survey databases and the later entry of corrections were done by Mrs. Blodgett, Ms. Chapaitis, and Mary Chaffee, Secretary in the Department of Agricultural Economics. The generation of printouts for the analysis presented in this report and the word processing of the various drafts of the report were done by Mrs. Chaffee. Ms. Chapaitis also helped with the telephone calls to town officials who had not completed and returned the long-form questionnaires before the dates when the researchers expected them.

A draft of this report also was reviewed by David Allee, Professor of Resource Economics in the Department of Agricultural Economics at Cornell, and by Nan Hanna, Executive Director of the New York State Supervisors and County Legislators' Association.

Sincere thanks is extended to all who assisted with the town microcomputer use survey for their inputs, their time, and their patience. Of course, any errors or shortcomings in this report are solely the responsibility of the author.

EXECUTIVE SUMMARY

Survey Objectives and Process

This report provides the findings of a survey undertaken by the Cornell University Local Government Program in late 1985 and early 1986 of microcomputer use by New York State towns. The survey was intended to help fill a research gap on microcomputer use by New York State local governments, in particular, small local governments; to produce information that might be used to improve an on-going program of microcomputer workshops for local government officials and employees; and to generate information that might serve as a basis for additional educational and technical assistance endeavors. A particular project that the researchers had in mind was a "town microcomputer use database" that a town could use to attain helpful information on microcomputer use by other towns.

A two-phase survey process was used. A one-page questionnaire -- the "short form" -- was sent to all of the state's 932 towns. Among other questions, this form asked respondents whether their towns used microcomputers and, if so, how many. Those towns that were using microcomputers were mailed and asked to complete a "long-form" questionnaire for each of their microcomputers. This form sought much more detailed information on the particular microcomputer system, the applications for which it was being used, and other matters related to the three survey objectives.

Short-Form Findings

The overall response to the short-form survey was excellent. A total of 705 (76 percent) of the state's 932 towns returned short-form questionnaires. Approximately 25 percent of the 705 questionnaires were from the 232 towns of each of the four 1980 town population quartiles, a measure of size of town government selected by the researchers for the analysis of many of the survey data. The ranges of population of these four groups of towns were as follows:

Quartile 1:	32 to	1,434;
Quartile 2:	1,436 to	2,635;

Quartile 3: 2,639 to 6,018; and

Quartile 4: 6,027 to 738,517.

The responses to the short-form survey indicated that less than one-quarter of all towns were using microcomputers and that use of microcomputers increased as size of town increased. Twenty-three percent (163) of the 705 towns that returned short-form questionnaires claimed that microcomputers were being used by their towns. The percentages of responding towns using microcomputers were 12 percent for Quartile 1, 11 percent for Quartile 2, 22 percent for Quartile 3, and 47 percent for Quartile 4.

An important implication of the above figures is that rural towns were tending to lag behind the non-rural towns in the use of microcomputer technology. This is so because almost all towns of less than 2,635 population -- the upper population limit of Quartile 2 -- would meet any reasonable definition of a rural town. This would probably be true even of many towns in Quartile 3.

The short-form survey data indicated that most microcomputers used for town purposes were owned by the towns, but that "other-use arrangements" became much more important as town size decreased. Of the 163 towns reporting use of microcomputers, 124 (76 percent) reported that they owned microcomputers, 41 (25 percent) reported other-use arrangements, and 2 (1 percent) had both arrangements. For the towns of Quartile 1, 4 percent reported town ownership and 8 percent reported other-use arrangements. The corresponding percentages for the towns of the other three quartiles were as follows: Quartile 2 -- 6 percent and 5 percent; Quartile 3 -- 16 percent and 6 percent; and Quartile 4 -- 43 percent and 4 percent.

Use for town purposes of a microcomputer owned by a town official or employee accounted for most of the other-use arrangements reported, both overall and in each of the town population quartiles. The next most frequently reported arrangement -- about half as many times -- was use of private service bureaus using microcomputers. One experimental cooperative arrangement, involving six towns and one village as joint owners of two microcomputer systems, was being disbanded at the time of the survey. Most of the members were making other microcomputer use arrangements.

The short-form questionnaire asked respondents to rate a number of means for assisting their particular towns with the acquisition and use of microcomputers. The most desired type of assistance was clearly "introductory microcomputer training sessions." A middle group of three approaches was rated highly enough to merit the conclusion that educational and technical assistance agencies should find it worthwhile to pursue them. In order of preference, these approaches were the following:

"contact list of NYS local governments using particular hardware and software for particular applications," "written instructions for using software programs to accomplish common applications (such as Lotus 1-2-3 for developing an annual budget)," and "self-study materials on initial acquisition and use of microcomputers." The methods rated fifth and sixth, namely, "microcomputer consulting" and "microcomputer fairs (vendor shows)," received significantly lower ratings than the first five, indicating that these are approaches in which towns had a low level of interest.

Long-Form Findings

Long-form questionnaires were returned for 167 microcomputers by 99 towns that were representative in terms of size of the group of towns of concern for this second survey. The researchers defined this group to be "direct-user" towns -- those towns in which microcomputers were directly used by town officials or employees for town purposes rather than used for these purposes by external persons or organizations (for example, a private service bureau). Since an actual count of direct-user towns did not exist, the data from the short-form survey were used to estimate the total number of direct-user towns and their distribution among the 1980 town population quartiles. Those towns returning the long-form questionnaires were found to be representative of the direct-user towns in these quartiles, that is, to be distributed among the quartiles in approximately the same way as the estimated total number of direct-user towns. The 99 towns represented about half of the total estimated group of concern (196 towns).

Data from the long-form survey enabled the researchers to answer questions concerning the pace of adoption of microcomputer technology by towns. A question on the survey asked in what year the microcomputer of concern for a particular questionnaire had been purchased by the town or, in the case of other-use arrangements, had first been used for town purposes. For responding towns as a whole, the survey data indicated that through 1985 there was a building of momentum in their direct access to microcomputer technology. But the data for the towns of the different quartiles indicated that this building of overall momentum was mostly a phenomenon of the towns of Quartile 4 and, to a much lesser extent, those of Quartile 3. There was no convincing evidence of year-by-year increases in the pace of adoption of microcomputer technology by the towns of Quartiles 1 and 2.

A question frequently of interest to town officials and employees is "What brands of microcomputers are towns using?" Microcomputers from 27 manufacturers were reported by the long-form respondents, but the number of these companies whose machines were reported ten or more times was only 5. IBM was clearly the dominant manufacturer. Forty-three towns,

representing 43 percent of the 99 responding towns, had 68 IBM microcomputers, representing 41 percent of the 167 microcomputers reported. The next highest number of towns using a particular brand of microcomputers was the 13 towns (13 percent) using 13 Tandy/Radio Shack machines.

A matter of even more interest to the researchers than patterns of manufacturer dominance was to what extent the microcomputers used by towns represented one or more groups of "highly compatible" microcomputers. The IBM PC (the PC, the PC XT, and the PC AT models) and highly compatible machines from other manufacturers constituted not only a large compatibility group, but also the only significant group of this nature among the towns responding to the long-form survey. Two-thirds of the responding towns (65 of 99) were using 103 IBM PC and highly compatible microcomputers, representing approximately the same proportion (62 percent) of the 167 microcomputers of the long-form survey.

Other data concerning the microcomputer equipment reported by the long-form respondents are noteworthy.

- A large proportion of the microcomputers reported by long-form respondents were not well-equipped for highly efficient and intensive use because of their lack of hard disks. These devices for the convenient storage and retrieval of software and large quantities of data were installed on only half (83) of the 167 microcomputers of the survey. Most of these machines (66) were reported by the towns of Quartile 4.
- Neither were most of the microcomputers of the responding towns well-equipped for sending and receiving microcomputer data via the telephone system. Modems, the devices necessary for using microcomputers in this fashion, were reported for only 29 (17 percent) of the 167 microcomputers. Twenty-three of the 29 modems were reported by the towns of Quartile 4.
- Printers from 27 companies were reported by the responding towns, but only 5 trademarks were reported more than ten times each, and none of these 5 accounted for more than 20 percent of the 132 printers for which names were reported. The most frequently reported brands were Epson (25 times) and Okidata (20 times).

The great bulk of the software products reported by the respondents consisted of commercial packages (those sold to many users) rather than custom products (those created for use by only one town). Twenty-eight (28 percent) of the 99 towns reported that custom software products were available for use with 35 (21 percent) of the 167 microcomputers, while the comparable figures for each of four types of commercial software products (for

example, spreadsheets) were much higher. The same pattern prevailed for the towns of each of the quartiles.

In terms of number of times reported, the commercial software packages formed two distinct groups. Those commercial packages that were reported by numerous towns for numerous microcomputers were word processing, spreadsheet, financial management, and database management packages. The group of commercial software packages reported by many fewer towns for many fewer microcomputers consisted of graphics, communications, statistics, and all other packages. This overall pattern of two groups was also true for the towns of each of the quartiles.

In terms of particular commercial software products (for example, Lotus 1-2-3) rather than types, the long-form respondents reported a broad array of products -- 191 -- with very little dominance by any of them. The number of particular products that were reported as available for use on ten or more microcomputers was only 6, and the most frequently reported of these products (Wordstar) was available for only 27 of the 167 microcomputers.

One of the reasons for asking the long-form respondents to identify their towns' custom software was the hope that arrangements could be developed for making available to many towns useful custom software reported by individual towns. A number of products that might be used to explore further the feasibility of this approach were identified -- for example, a spreadsheet application for doing payroll calculations.

A major part of the long-form questionnaire asked respondents to identify from a lengthy checklist the applications for which their towns were using microcomputers and to describe their other applications -- if any -- on numerous blank lines. The responses were grouped into 18 areas of applications relating to particular local government service areas and functions. Both for responding towns as a whole and for the towns of each of the 1980 town population quartiles, only two areas of applications were common. These were central-staff financial management applications and central-staff word processing applications. Central-staff applications were defined as those generally undertaken by central staff (elected or appointed) that involve town operations as a whole or that are commonly done by such persons on behalf of a number of particular town service and functional areas. Sixty-one (62 percent) of the 99 responding towns reported one or more central-staff financial management applications, and 48 (48 percent) reported one or more central-staff word processing applications. For the remaining sixteen areas of applications, the next highest number of towns was the 23 (23 percent) that reported one or more real property tax applications.

Even for the two most common areas of applications, most of the respondents were not using their microcomputers for even half

of the applications specifically described in the questionnaire checklist, nor did they describe many others on the blank lines. In short, the applications data help support the conclusion that towns as a whole were in the early stages of putting microcomputer technology to use at the time of the survey.

The overall response of the long-form respondents to the question concerning degree of satisfaction with their microcomputer systems was ambiguous. Of those forms on which the question was answered, 83 percent provided answers indicating a satisfied rating. But the question was not answered on 38 percent of the forms. In most cases, it was not clear why the question was not answered.

The long-form data indicated that inadequate training may have been a significant problem for town microcomputer operators, especially those of smaller towns. The long-form respondents reported that training had been inadequate or non-existent for the use of 65 (39 percent) of the 167 microcomputer systems that they reported. Moreover, for the towns of each of the first three quartiles, these two answers were provided for more than 50 percent of the microcomputer systems. Even for the towns of Quartile 4, the training that operators received for use of 33 percent of the microcomputer systems reported was described as inadequate or non-existent.

Another matter of interest to the researchers was the number of persons operating the microcomputers used for town purposes "on a fairly regular basis." Sixty-one percent of the 167 machines were used regularly by one or two persons, 20 percent were used regularly by three persons, 7 percent were used regularly by four persons, and 8 percent were used regularly by five or more persons. More persons shared the use of microcomputers in the towns of Quartile 4 than in the smaller towns of the other three quartiles.

The long-form respondents reported useful data about three forms of external expert assistance provided to operators of microcomputers used for town purposes. These types of assistance were the following: microcomputer consultants retained on a continuing basis, microcomputer consultants paid when their services were needed, and citizen-volunteers with special knowledge of microcomputers. The operators of one-third of the 167 microcomputers of the long-form survey had access to one of these types of assistance. The type that is probably the most helpful -- a consultant retained on a continuing basis -- was the least commonly available. Those operating microcomputers for the towns of Quartiles 1 and 2 had almost no access to the three types of external assistance, while the operators for the towns of Quartiles 3 and 4 were in a much better position.

The long-form questionnaire asked respondents to indicate in their own words the "most important limitations or problems you have experienced in using this microcomputer." One or more

limitations or problems were identified on 120 questionnaires and were grouped into 31 general answers. Only two of the answers were given significant numbers of times, namely, "need for training" and "inadequate software." The former was the response given most frequently by respondents from the towns of each of the four 1980 town population quartiles, while the towns of Quartile 4 accounted for 80 percent of the "inadequate software" responses.

The final question of the long-form survey asked the respondents to draw upon their towns' experiences with the microcomputer on which they were reporting to provide their "single most important bit of advice" for another jurisdiction interested in acquiring a microcomputer. Responses were provided by 106 respondents and grouped into 14 broadly stated answers. Half of the 106 responses provided advice relating to the processes of buying hardware, software, or both. These answers also constituted the most frequent category of responses for the towns of each of the 1980 town population quartiles. While these answers were diverse, most of them provided summary versions of the microcomputer procurement process generally advocated by knowledgeable parties or emphasized certain aspects of this process. This provides a strong confirmation from actual experiences of towns that a decision to follow the advice of the experts is a wise one.

Status of the Town Micro-computer Use Database

As noted earlier, one of the three objectives of the town microcomputer use survey was to generate information that might be used for educational and technical assistance endeavors beyond those in which the Local Government Program was already engaged. A particular project that the researchers hoped to pursue was the creation of a town microcomputer use database that a particular town could use to attain helpful information on microcomputer use by other towns. This concept was included among the approaches for helping towns acquire and use microcomputers that respondents were asked to rate on the short-form questionnaires. In addition, it was anticipated that much of the information requested on the long-form questionnaires would prove useful for constructing the database.

Although the short-form respondents rated the concept of the database quite favorably, it has not been possible to undertake the time-consuming tasks of creating and maintaining it and promoting its use by towns. Unfortunately, during the analysis of the survey data, the Local Government Program suffered a major personnel reduction that left it without the resources needed to continue working on the database. Attempts to attain grant monies to fund this project's completion have not yet been successful.

I. INTRODUCTION

In the spring of 1984, the Cornell University Local Government Program cooperated with the New York State Supervisors and County Legislators' Association to present a pilot program of one-day microcomputer workshops for town and county officials and employees at five central locations in New York State. The association prepared and mailed announcements to town and county governments, handled advance registrations, made arrangements for the use of motels and hotels for training sites, and handled other logistics. Two members of Cornell's Cooperative Extension staff planned the program, brought to the workshops Cornell-owned microcomputer hardware and software so that participants could benefit from "hands-on" experience, and served as instructors.

There were three primary motivations for this experimental effort. One was the conviction on the part of the two sponsors that, given the substantial decreases in the costs of microcomputers systems, they offered substantial promise for improving the operations of the great majority of New York's general-purpose local governments (cities, counties, towns, and villages.) Second, most local government officials and employees appeared to have little understanding of basic microcomputer concepts, the appropriate uses of this technology, how best to acquire and put it to use, and the potential problems and frustrations they might encounter with it. Such lack of knowledge, it was thought, would substantially inhibit the realization of the technology's potential for improving local government operations. Third, "hands-on" microcomputer workshops were an appropriate way to address this lack of knowledge. But the existing workshop opportunities were almost always at distant large cities at costs that all but a few local governments found prohibitive. Thus, there seemed to be a place for workshops with low registration fees at locations that did not require overnight trips for participants.

Encouraged by the response to this initial pilot program, the two sponsors decided to continue with an improved version of the workshops. The length of the workshops was increased to two days, and additional topics were added to the program, in large part in response to the evaluation comments of workshop participants. Additional microcomputers were secured so that more participants could be accommodated at each workshop, and the intended audience was expanded to include city and village

officials and employees. A series of these workshops were held each spring and fall through 1986.¹

During this time period, the two Cornell instructors and other staff at Cornell also initiated related projects. These included a three-day pilot workshop at Cornell oriented more to the needs of county officials and employees than the two-day regional workshops, a greatly enhanced version of a microcomputer program for preparing town budgets that had been developed earlier at Cornell under a contract with the New York State Commission on Tug Hill, a village version of this software, and a two-phase survey of microcomputer use by New York towns.

The town microcomputer use survey, the subject of this report, had three major objectives:

- No systematic research had apparently been done on the use of microcomputers by New York State local governments. Indeed, few research findings were available on microcomputer use by small local governments (those with populations of less than 10,000) anywhere in the United States. Thus, one objective was to help fill this research gap by producing reports that would provide information on microcomputer use by at least a portion of New York State's local governments, including units of small population. These reports, it was hoped, would be useful to a number of parties. These included state and local government officials and employees in New York, staff members of statewide local government associations, other providers of education and technical assistance to the state's local governments, including Cornell Cooperative Extension staff, vendors of microcomputers systems to these governments, and local government researchers in New York State and elsewhere.
- Another objective was to produce information that might help improve the microcomputer workshops for local government officials described above. For example, the survey findings might influence the choice of new hardware and software for use in the workshops, identify the problems most frequently encountered by New York State local governments using microcomputers, and indicate that a component on a certain type of application should be added to the workshop program.

¹The four workshops conducted in the fall of 1986 were cosponsored by the New York State Association of Towns and the Cornell Local Government Program.

- A third objective was to generate information that might serve as a basis for additional educational and technical assistance endeavors. A key project that the Cornell staff had in mind was the creation of a "town microcomputer use database" that would identify towns using microcomputers, the hardware and software they were using, the applications for which they were using their hardware and software, and related information. Through use of this database, a local government might be able to identify other local governments to consult about their experiences with the use of microcomputers. Another possible project would be to identify from the survey responses software of possible use to many jurisdictions that survey respondents had developed solely for their own use, to review and, if necessary, to improve this software and its documentation, and to make these software products available to other local governments.

The decision to focus the survey solely on towns was due to a number of interrelated reasons, most of them quite practical in nature. The Cornell researchers wanted the database referred to above to include a high percentage of jurisdictions using microcomputers to ensure a high level of utility for users of the database. Thus, they concluded that although surveying an appropriate sample of the state's local governments would enable them to provide findings about use of microcomputers by these governments, such a survey would not generate information on a sufficient number of local governments using microcomputers for the database. On the other hand, the staff time and funds available for this project precluded attempts to survey all of the state's approximately 1,600 cities, counties, towns, and villages. Therefore, the Cornell staff decided to survey all towns largely because the membership of the cosponsor of the workshops at that point, the New York State Supervisors and County Legislators' Association, included town supervisors and because more town than city, county, or village personnel were attending the regional workshops. Reasons that supported this choice were the facts that towns are the most numerous type of general-purpose local government in New York State (932 of the approximately 1,600 total units) and are also the most diverse in terms of population size and services provided. A final justification was that similar surveys could be done later for cities, counties, and villages if the town survey proved worthwhile and sufficient resources became available.

This report is addressed primarily to the first objective identified above. The next section provides a general description of the survey forms, the survey procedures, the time period of the survey, and the number of responses received. This is followed by two sections that present the results and analysis for the two related questionnaires that were used, the "short form" and the "long form". A final section briefly describes the

steps necessary for making operational and maintaining the town microcomputer use database referred to above and reports the status of that project.

II. A TWO-PHASE SURVEY PROCESS: AN OVERVIEW

Because the survey designers wanted certain very limited information from as many as reasonably possible of the state's 932 towns, they designed a one-page mail questionnaire -- the "short form" -- that could be easily completed in a few minutes (see Appendix A.) This form was sent to all town supervisors with a request that it be completed by the supervisor or another knowledgeable person. It asked respondents to rate a number of specific approaches for assisting their particular local governments with the acquisition and use of microcomputers. It also asked them to indicate whether their local governments were using microcomputers and, if they were, how many were being used and under what ownership arrangements. The towns that responded that they were using microcomputers were also asked to identify the most knowledgeable town official or employee to contact about their microcomputer use.

This latter question generated potential respondents for a much more detailed questionnaire -- the "long form" (see Appendix B). They were mailed a number of long-form questionnaires equivalent to the number of microcomputers identified on the particular town's short-form questionnaire; it was requested that one form be completed for each microcomputer. They were asked to either complete the questionnaires themselves or to oversee their completion and return by other appropriate town officials and employees. The long form first asked for the names of the manufacturer and model and the date of purchase of the microcomputer. These questions were followed by a major section that asked respondents to identify their hardware components and software and to indicate their satisfaction with them. The second principal section asked respondents to identify the applications for which a particular microcomputer was being used and to estimate the number of hours per month it was used for each application. A third section asked about a number of matters that the survey designers believed would serve the survey objectives, such as the adequacy of training and important problems experienced in the use of the particular microcomputer.

The two questionnaires were distributed and completed from October 1985 into July 1986. The short-form questionnaire was first mailed to all towns in October 1985. A second mailing was made in November to towns who had not responded to the first mailing. The second mailing generated significantly more responses than the first, perhaps in part because the 1985 elections were no longer claiming the time of town officials. General experience with mail surveys indicated that the improved

response to the second mailing probably meant that a third mailing would prove worthwhile. This was done in February 1986. Long-form questionnaires were mailed to the appropriate persons on a continuing basis as the short-form questionnaires were returned, generally within a week of the receipt of a short-form questionnaire identifying a particular town as a user of microcomputer technology. After an appropriate interval of time, follow-up telephone calls were made to those persons who had not returned their long-form questionnaires, and follow-up mailings were made if necessary. A total of 705 short-form questionnaires were returned by the same number of towns, and a total of 167 long-form questionnaires were received from 99 towns. Four of the short-form questionnaires were received in May 1986, and 16 of the long-form questionnaires were received in May, June, and July 1986. The remainder of the forms were received in preceding months.

III. ANALYSIS OF THE SHORT-FORM RESPONSES

The Short-Form Respondents

The response to the short-form survey was excellent. A total of 705 (76 percent) of the state's 932 towns completed and returned short-form questionnaires. These 705 towns were representative of towns of different sizes as categorized in terms of 1980 town population quartiles, a measure of size of government selected by the researchers for their analysis. As indicated by Table 1, approximately one-fourth of the 705 responding towns were from each of the four town population quartiles.²

The decision to use town population quartiles as a measure of town population size was based on a number of reasons. Measures other than population size could have been employed, such as magnitude of annual operating budget or number of full-time equivalent employees. But size of population seemed to be the most commonly used measure of size of local government in other studies of computer use by local governments. It also seems to be the indicator of size most often used by students and practitioners of local government in New York State as well as by state decision-makers interested in local government matters. A greater number of town population groups than four could have been chosen. But the researchers hypothesized that four would be sufficient to show important differences in microcomputer use among sizes of towns.

As readers proceed through this report, they should keep in mind the population limits of the towns of the different quartiles or refer to Table 1 as necessary to refresh their memories. Frequent references to these different groups of towns will be made. A reference to towns of the first quartile, for example, simply means those 233 towns (one-quarter of the total of 932 towns) that had 1980 populations between 32 and 1,434, as indicated in Column 1 of Table 1.

²The area of a town includes the area of any village wholly or partially within town boundaries, making village residents also town residents. Thus, the town population figures used for the survey analysis include village residents for those towns containing village territory.

Table 1. TOWN GOVERNMENTS RESPONDING TO THE SHORT-FORM SURVEY, BY SIZE OF POPULATION
705 New York Towns, 1985-1986

1980 town population quartiles ^{a/}	Number of towns in quartile	Number of short-form respondents	% of total short-form respondents
1 (populations of 32 to 1,434)	233	173	24.5
2 (populations of 1,436 to 2,635)	233	172	24.4
3 (populations of 2,639 to 6,018)	233	178	25.3
4 (populations of 6,027 to 738,517)	<u>233</u>	<u>182</u>	<u>25.8</u>
Totals	932	705	100.0

^{a/} Village populations are included in the town population figures used here.

SOURCE: The town population figures are from the 1980 census of population, but were taken from a computer file provided by the Office of the New York State Comptroller.

Use of Microcomputers by Towns of Different Sizes

The short-form survey confirmed the researchers' hypotheses that considerably less than 50 percent of all New York State towns were using microcomputers and that increases in the use of microcomputers would be associated with increases in size of towns. Twenty-three percent (163) of the 705 towns that returned short-form questionnaires claimed that they owned microcomputers, had "another microcomputer use arrangement," or had both of these arrangements. As shown in Table 2, the percentages of responding towns in Quartiles 1 and 2 owning and having other microcomputer use arrangements were low and at approximately the same level--approximately 11 percent (20 towns in Quartile 1 and 18 towns in Quartile 2). But this figure doubled for Quartile 3 -- to 22 percent (39 towns) -- and doubled again for Quartile 4 -- to 47 percent (86 towns).

There are a number of plausible explanatory factors that may be put forth for the fact that less than one-quarter of all New York State towns were using microcomputers at the time of the survey. Although microcomputers have now been on the market for more than a decade, it was only after the introduction of the IBM PC in August 1981 that the pace of adoption of microcomputer technology by society in general really became impressive. Thus, the length of the "true microcomputer revolution" was still quite short at the time of the survey. Software products created specifically for New York State local governments had generally been on the market for even shorter periods of time. Even at the time of the survey, such software packages did not appear to be numerous, nor did the great majority of town officials and employees appear to know of the few in existence. In addition, lack of knowledge and experience with computer technology in general on the part of many town officials and employees probably made them unwilling to move quickly into use of microcomputers. Also, the 1980s have not been a particularly prosperous time for many towns; microcomputers may therefore have seemed to fall into the "nice but not necessary" category of improvements in town operations. Finally, many interested town officials probably wanted to hear about successful use of microcomputers by other jurisdictions before making a commitment to their use.

Table 2. TOWN USE OF MICROCOMPUTERS, BY 1980
TOWN POPULATION QUARTILES
705 New York Towns, 1985-1986

1980 town population quartiles	Percent of responding towns in each quartile:		Total Percent
	Owning m/cs ^{a/}	With another m/c use arrangement	
1	4.0	8.1	11.6 ^{b/}
2	5.8	5.2	10.5 ^{b/}
3	15.7	6.2	21.9
4	43.4	3.8	47.2

^{a/} "M/c" is an abbreviation for microcomputer.

^{b/} In both Quartiles 1 and 2, one town both owned a microcomputer and had another microcomputer use arrangement. In both cases, this town was counted only once for calculating the percentage shown in the final column.

An important implication of the above quartile percentages is that New York State's rural towns are tending to lag behind the non-rural towns in the use of microcomputer technology. There are some towns in New York State with such large land areas that even though their 1980 populations placed them in Quartile 4, most observers would consider them rural. On the other hand, almost all towns of less than 2,635 population -- the upper limit of Quartile 2 -- would strike most observers as rural. This would probably be true even of many towns in Quartile 3. As noted above, towns in these quartiles were much less likely than those in Quartile 4 to be using microcomputers.

What kinds of reasonable explanations can be hypothesized for the much lower use of microcomputers by rural towns? One potential explanation that the researchers do not think is justified is that microcomputer technology is not generally cost-effective for these governments. This needs to be investigated further, perhaps by means of careful case studies of rural towns that are using or have tried to use microcomputer technology. The researchers' field experience has provided them with general familiarity with a number of candidates for such studies. These cases suggest that, if properly selected, acquired, and used, microcomputer systems constitute cost-effective technology for the great majority of New York State's rural local governments.

Among other possible explanatory factors that seem more plausible, three would seem to be of considerable importance. One is that towns of larger populations have greater needs to do the types of things that microcomputer systems are designed to help organizations do -- to organize, update, and manipulate large amounts of data. Secondly, the purchase of an initial microcomputer and accompanying software (as well as the purchase of additional systems) is a considerably less significant expenditure in the budgets of larger towns than in those of rural towns. Thirdly, it is possible that there has been a significantly more limited understanding of microcomputer technology in general and its usefulness to local governments in particular among officials and employees of rural local governments. One reason for this might be that the technology has not been as generally prevalent in rural areas as in suburban and urban areas, thus reducing the opportunities of local government officials and employees to learn about it through day-to-day exposure. Another reason could be that their access to formal educational opportunities to learn about the technology (college courses, adult education workshops, training provided by businesses to their employees, etc.) has been significantly more limited.

Microcomputer Ownership by Towns
Versus Other-Use Arrangements

Another of the researchers' hypotheses generally supported by the short-form data was that most microcomputers used for town purposes would be owned by the towns themselves, but that other-use arrangements would become relatively more important as town size decreased. A total of 124 towns reported that they owned microcomputers, while 41 reported other-use arrangements.³ As Table 2 indicates, microcomputers were owned by 4 percent of the towns of the first quartile (the smallest towns), while a much larger percentage of towns from this quartile -- 8 percent-- claimed other-use arrangements. For the towns of the second quartile, the percentages were approximately equal, with 6 percent owning microcomputers and 5 percent with other-use arrangements. For the third quartile, two and one-half times as many towns were owners as had other-use arrangements (16 percent as opposed to 6 percent). This multiple increased to eleven for the fourth quartile (43 percent versus 4 percent).

Table 3 shows that use for town purposes of a microcomputer owned by a town official or employee accounted for most of the other-use arrangements reported, both overall and in each of the town population quartiles. This arrangement was reported by 26 of the total of 41 towns with other-use arrangements. For each quartile, it was reported by at least half of the towns. While for the second quartile nearly as many towns reported arrangements with private-sector service bureaus using microcomputers as ownership by an official or employee, on the whole, the service-bureau arrangement was reported much less frequently -- by only 12 towns.

Although the data on town ownership as opposed to other-use arrangements generally conformed to what the researchers had expected, the actual percentages of towns reporting other-use arrangements and the use for town purposes of microcomputers owned by employees and officials were significantly higher than expected. Twenty-five percent of the towns reporting use of microcomputers (41 of 163) claimed other-use arrangements, and 16 percent (26 of 163) claimed use of microcomputers owned by officials or employees.

What are some possible reasons that numerous towns were involved in these other-use arrangements rather than town ownership? The researchers' field experience and a few comments on the short-form questionnaires suggest a number of reasons, one or more of which might be involved in the case of a particular

³Two of the 124 towns that owned microcomputers also had other-use arrangements and therefore are also included in the 41 reporting other-use arrangements.

Table 3. TOWNS WITH NON-OWNERSHIP MICROCOMPUTER
USE ARRANGEMENTS, BY 1980
TOWN POPULATION QUARTILES
41 New York Towns, 1985-1986

1980 town population quartiles	Number of towns with:			Totals
	M/c owned by official or employee ^{a/}	Service bureau arrangement	Other arrangements	
1	10	4	1	14 ^{b/}
2	5	4	1	9 ^{b/}
3	7	3	1	11
4	<u>4</u>	<u>1</u>	<u>2</u>	<u>7</u>
Totals	26	12	5	41

^{a/} "M/c" is an abbreviation for microcomputer.

^{b/} One town in each of these quartiles reported two different other-use arrangements. Each town is counted only once in this column.

town. In a few instances, a decision by a town not to purchase a microcomputer may have prompted an employee or official to personally purchase a machine to be used solely or almost entirely for town purposes. Probably much more common was an employee or official's ownership of a microcomputer used principally for private purposes. The supervisor's bookkeeper in one town, for example, was preparing the town payroll on the microcomputer used in the supervisor's pharmacy business. The use of a service-bureau arrangement probably almost always involved an attempt to gain access to microcomputer technology for clearly defined and quite limited financial management purposes at a cost that town decision-makers considered significantly more affordable than that of microcomputer ownership. Another consideration might have been the desire to gain such access without the perceived risks of costly and embarrassing mistakes and failures on the part of a particular person or the town itself. In some cases, use of a service bureau probably also reflected the conclusion of an employee or official that he or she did not have the time to learn to operate a microcomputer.

In most cases, these other-use arrangements will probably prove to be transitional to town ownership of one or more microcomputer systems. In general, it seems reasonable to expect

that the other-use arrangements will demonstrate to initially skeptical officials and employees the substantial benefits of using microcomputer systems for town purposes, raise expectations about the quantity and quality of work performed by town officials and employees, highlight the limitations of the service-bureau arrangement as opposed to first-hand access to a microcomputer, and leave town officials and employees feeling deprived when a microcomputer becomes unavailable for town use because its owner no longer holds a town position.⁴ In most instances these outcomes should be strong incentives for towns to purchase microcomputer systems. The increasing affordability of microcomputer systems should add yet another incentive for town ownership to follow from other-use arrangements.

Another noteworthy point concerning other-use arrangements is that it does not seem likely that town use of microcomputer technology by means of private service bureaus will ever become very widespread. Only 7 percent of the towns reporting use of microcomputers (12 of 163) reported use of this arrangement. A much greater percentage of responding towns did report service bureau arrangements with private organizations and county governments, but these involved minicomputers and mainframe computers rather than microcomputers. The considerable advantages of an in-house microcomputer over access through a private service bureau, the affordability of microcomputer technology, and the availability of "user-friendly" software pose serious obstacles to the widespread use by towns of private service bureaus for access to microcomputer technology.⁵

Neither does it seem likely that cooperative ownership of microcomputer systems by towns will become widespread. One experimental cooperative arrangement, involving six towns and one village in Lewis and Oswego Counties and considerable assistance from a state agency, was being disbanded at the time of the

⁴One basis for these expectations is provided by Donald Norris' conclusions concerning "impacts on work" from his eight case studies of microcomputer use by local governments. In summary, he found few negative impacts and many positive ones. See Donald F. Norris, Microcomputers and Local Government, 2nd ed. (Washington, D.C.: International City Management Association, 1986), pp. 97-99.

⁵The 1985 report on a national survey of local government computer use sponsored by the International City Management Association provides support for this conclusion. See John Scoggins, Thomas H. Tidrich, and Jill Auerbach, "Computer Use in Local Governments," Baseline Data Report, Vol. 17, No. 9 (Washington, D.C.: International City Management Association, September 1985), p. 2.

survey. Most of its members were buying their own microcomputer systems or were negotiating arrangements with a private service bureau.⁶ No other instances of joint or cooperative ownership were reported on the short-form questionnaires. In terms of operating methods, the cooperative approach would seem to have much in common with the private service bureau; its use will probably be inhibited by the same factors cited above in relation to that approach. In addition, the time that officials and employees must invest to negotiate a local government cooperative agreement is often considerable. A microcomputer cooperative would seem most attractive to smaller towns, but their leaders may not want to -- or be able to -- incur these time costs. Much of this negotiating input could be provided by county governments, state agencies, or perhaps by a state local government association, but sufficient incentives to cause them to do so have apparently been lacking. It seems unlikely that this situation will change.

Town Preferences for Educational and Technical Assistance

The short-form questionnaire asked respondents to rate a number of means for assisting their towns with the acquisition and use of microcomputers. The specific question asked was "What assistance would be best for your government for acquiring and/or using microcomputers?" Six specific methods were listed along with a space for respondents to describe additional methods in their own words. The respondents were asked to "use numbers to indicate as many priorities as you wish" with one being used for the highest priority. Despite this instruction, numerous respondents simply checked one or more methods. Where more than one check was made, the researchers assumed that the check indicated preferred methods, but that the respondents did not prefer one over another. Thus, they recorded all such checks as ones. Approximately 250 respondents provided no ratings, a probable indication for most of them of a lack of interest in using microcomputer technology.

The ratings were analyzed in two ways. One involved simply determining the number of times a particular method was given a rating of one. The second method used was a statistical method that involved -- among other steps -- assigning proportional weights to the number ratings so that ratings lower than one could be taken into account. A rating of one was assigned a weight of ten and other ratings were given lower numbers. This

⁶This was a two-year pilot project initiated by the New York State Commission on Tug Hill. The member governments purchased two microcomputer systems, and the commission provided personnel support for computerizing the members' bookkeeping, training local personnel to use the microcomputers, and managing the cooperative.

method might allow, for example, a method that was rated two and three by a great number of respondents to achieve an overall priority score higher than another method that was rated one by a lower number of respondents.

The outcomes of these two methods of analysis were essentially the same, as shown in Table 4. The most desired type of assistance was clearly introductory microcomputer training sessions. The approaches that were rated second, third, and fourth were, respectively, "contact list of NYS local governments using particular hardware and software for particular applications," "written instructions for using software programs to accomplish common applications...", and "self-study materials on initial acquisition and use of microcomputers." Because of the relative closeness of the overall ratings of these three methods, they might be considered a "middle group" of preferred methods. Their ratings are high enough to merit the conclusion that these are approaches that educational and technical assistance agencies should find it worthwhile to pursue. The methods rated fifth and sixth, namely, "microcomputer consulting" and "microcomputer fairs (vendor shows)," received significantly lower overall ratings, indicating that these are approaches in which towns have a low level of interest.⁷

Some interpretative comments concerning these ratings may be helpful.

The top rating given introductory microcomputer training sessions may stem from at least two important factors. This rating almost certainly reflects an inadequate understanding of microcomputer technology on the part of the officials and employees of most towns and their desires to overcome this limitation. If this were not the case, a method of a different nature should have received the highest rating. The second important factor that this rating may reflect is a lack of availability of such sessions that meet the requirements of most towns. Experience with training local government officials and employees in New York State strongly suggests that these requirements generally include low fees, training sites that do not require overnight trips for participants, and time commitments of no more than two days.

The fact that respondents accorded the lowest rating to microcomputer shows probably also stems to a significant extent from their inadequate understanding of microcomputer technology. Such shows can be quite confusing and of little help if one has a

⁷Only 42 answers were provided in the space allotted for respondents to describe additional methods in their own words. None of these methods received overall ratings as high as any of the six specifically described methods.

Table 4. RATINGS OF METHODS FOR ASSISTING TOWNS
TO ACQUIRE AND USE MICROCOMPUTERS
459 New York Town Officials, 1985-1986

Methods	No. of times rated "1"	Weighted scores
Introductory microcomputer training sessions	222	5.7
Contact list of NYS local governments using particular hardware and software for particular applications	150	4.7
Written instructions for using software programs to accomplish common applications (such as Lotus 1-2-3 for developing an annual budget)	136	4.5
Self-study materials on initial acquisition and use of microcomputers	119	4.0
Microcomputer consulting	45	2.3
Microcomputer fairs (vendor shows)	23	1.4

very limited understanding of the technology that is being demonstrated and explained.

The higher priority given by the respondents to introductory microcomputer training sessions than to self-study materials on initial acquisition and use of microcomputers may reflect in good part the training preferences of the respondents for this type of subject matter. They probably assumed that the training sessions would involve actual use of microcomputers, since this is usually the case. Thus, their ratings may mean that they see "hands-on" training as a significantly better way of learning about microcomputers than studying written materials. It is also possible that the difference in ratings reflects the conclusion on the part of many respondents that it is easier to fulfill a commitment to attend training sessions than a promise to oneself to study written materials.

The relatively high rating given to a contact list of New York State local governments using particular hardware and software for particular applications is consistent with thoughts often expressed by local government officials. When perplexing problems or the use of unfamiliar new approaches are under

consideration, local officials often want to know what was tried by "governments like us" that faced the same situation and what the outcomes were. Thus, it is reasonable that they would be interested in this type of information concerning microcomputer use.

A partial test of whether the creation of written instructions for using software programs to accomplish common applications is a viable way of assisting towns is provided by the experience thus far of the Cornell Local Government Program with its "Town Budget Worksheet." This product consists of a user's manual and a microcomputer diskette for use with the Lotus 1-2-3 electronic spreadsheet that help a user prepare a town budget. The worksheet has been available for purchase by towns since September 1986. While a thorough evaluation study is needed, both sales and feedback from a number of purchasers have been encouraging. This suggests that, given the right product, this approach is indeed a good way to assist towns with the use of microcomputers.

The low rating given microcomputer consulting is probably not inconsistent with the experience with this alternative of the New York State Department of State and the New York State Conference of Mayors. Long waiting lists of local governments wanting microcomputer consulting services developed when these organizations offered this type of assistance. It was, however, provided at no charge by the former organization and at a rate substantially lower than those normally charged by private consultants by the latter organization. The assumption of most respondents to the short-form survey was probably that "microcomputer consulting" would be provided by private consultants charging hourly rates that their towns were not willing to pay.⁸

Respondents also were asked to rate four times for the presentation of introductory microcomputer training sessions. The two methods of analysis described above were used again, and both again yielded the same order of quite distinct preferences. The most highly rated time was weekdays. The times rated second and third were, respectively, evenings and Saturdays. The top ranking for weekdays as apposed to the second and third priorities may reflect a common assumption that the persons most likely to use microcomputers for town purposes are those working weekdays for towns rather than the "part-timers" who spend their weekdays at non-town jobs or at other activities. The time rated lowest was during meetings of statewide local government

⁸The President of the Independent Computer Consultants Association, an organization of some 4,000 consultants, stated in 1985 that "anything between \$50 and \$150 an hour is within reason" for a competent computer consultant. See Mark Stevens, "Consult Before You Hire a Computer Consultant," Newsday, December 30, 1985, part 3, page 4.

associations. In this case, the rating probably reflects a conclusion by most of those answering this question that such training could not be easily integrated into the customary agenda of these meetings or that these meetings should serve other purposes.

IV. ANALYSIS OF THE LONG-FORM RESPONSES

The Long-Form Respondents

To assure themselves of the adequacy of the response to the long-form survey, the researchers needed to establish which towns comprised the long-form survey universe, the total group of concern for this survey. It was decided that this group should be considered to be those towns in which microcomputers were directly used by town officials or employees for town purposes. Those towns for which an external person or another organization was using a microcomputer to do work for the town should be excluded. The research rationale behind this distinction was that the researchers wanted data on town microcomputer use arrangements that augmented the capacity of towns to directly use microcomputer technology. This research rationale was buttressed by a practical one: the possibilities of getting the external providers of microcomputer services to complete the long-form questionnaires seemed very low.

Since an actual count of this universe did not exist and since analyzing the data by size of town again seemed important, the size of the universe and its distribution among 1980 town population quartiles was estimated on the basis of the short-form survey data on "direct-user towns." Given the criteria stated above, direct-user towns were considered to include those towns owning microcomputers and those for which an employee or official was using her or his microcomputer for town purposes. Towns with a service bureau arrangement were excluded. The five towns with other arrangements (see Table 3) were included or excluded depending on the facts of their particular situations. For example, a town using a leased microcomputer was included. For each quartile, the number of direct-user towns responding to the short-form survey was then used to generate an estimate of the total number of direct-user towns for the quartile. These four estimates were then summed to generate an estimate of the total number of direct-user towns.

An example will show how this estimation process worked. For Quartile 1, the short-form survey data indicated that there were 7 towns that owned microcomputers. Nine of the 14 towns that had other-use arrangements qualified as additional direct-user towns. Thus, the total number of direct-user towns in Quartile 1 indicated by the short-form survey data was 16. These 16 towns represented 9.2 percent of the total number of towns in Quartile 1 that responded to the short-form survey (173 -- see Table 1). There were 233 towns (25 percent of 932) towns in each

1980 town population quartile. Thus, 9.2 percent of the 233 towns in Quartile 1 equals 21 towns, the estimated number of direct-user towns of Quartile 1. Use of the same process generated estimated numbers of direct-user towns for the other three quartiles. The estimates for the four quartiles were then summed to produce a total estimate of 196 direct-user towns. The estimated 21 direct-user towns of Quartile 1 represented 10.7 percent of the total estimate of 196 direct-user towns.

As Table 5 shows, the 99 towns that returned the long-form questionnaires were representative of direct-user towns of different sizes as categorized in terms of 1980 town population quartiles. A comparison of Columns 3 and 5 of Table 5 indicates that the percentage of towns returning long-form questionnaires was very close to the percentage of direct-user towns for each quartile. For example, an estimated 10.7 percent of the total estimated number of 196 direct-user towns was from Quartile 1, and 11.1 percent of the total of 99 towns returning long-form questionnaires represented towns of this quartile.

Table 5. LONG-FORM RESPONDENTS COMPARED TO DIRECT-USER TOWNS, BY 1980 TOWN POPULATION QUARTILES
99 New York Towns, 1985-1986

1980 town population quartiles	Estimates of direct-user towns	% of total direct-user towns	Long-form respondent towns	% of total long-form respondent towns
1	21	10.7	11	11.1
2	20	10.2	9	9.1
3	46	23.5	23	23.2
4	<u>109</u>	<u>55.6</u>	<u>56</u>	<u>56.6</u>
Totals	196	100.0	99	100.0

The Momentum of Town Adoption of Microcomputer Technology

The answers to a question on the long-form questionnaire enabled the researchers to address questions concerning the momentum of adoption of microcomputer technology by towns. This question asked in what year the microcomputer of concern for a particular questionnaire had been purchased by the town or, in the case of other-use arrangements, first used for town purposes. The researchers wanted to know whether there was evidence of a "building of momentum" from year to year in the use of microcomputers by towns. In other words, was the pace of adoption of microcomputer technology increasing? Moreover, were there differences in the pace of adoption of microcomputer technology among towns of different sizes? Among possibly other uses, answers to these questions should prove helpful for those interested in providing towns with microcomputer hardware, software, and related services, including education and technical assistance.

Tables 6 and 7 provide data from two different perspectives that are relevant to these questions. Using 1980 town population quartiles, Table 6 combines data from the long-form survey on (1) year of purchase of town-owned microcomputers and (2) year of first use for town purposes for microcomputers used directly by town officials and employees under other-use arrangements. In short, its perspective is number of microcomputers. Table 7 provides data from the long-form survey on the number of towns that purchased microcomputers each year by 1980 town population quartiles. If a town purchased microcomputers in more than one year, that town was counted once in each year.⁹ The data of Table 6 might be considered slightly less relevant, since they include other-use arrangements. In general, these arrangements represent a less firm commitment to microcomputer technology than town ownership of microcomputers. In any event, as the following paragraphs indicate, both tables support the same conclusions.

⁹The data for 1985 in both Tables 6 and 7 could be somewhat understated. Since the survey process began in October, some towns may have acquired microcomputers after completing one or both of the survey forms. Such an understatement probably would not significantly alter the conclusions presented here and might even strengthen them.

Data for 1986 are not included in the two tables even though a few of the microcomputers for which long-form questionnaires were completed had been purchased or first used for town purposes in 1986. The portion of 1986 included in the survey period was not sufficient for the development of figures for that year comparable to those of preceding years.

For responding towns as a whole, it appears that through 1985 there was indeed a building of momentum in their direct access to microcomputer technology. The last column of Table 6 indicates that of the 156 microcomputers for which the table provides data, only 6 had been purchased or were being used under other arrangements at the end of 1981. Each year thereafter saw an increase in the number of microcomputers purchased or first used under other arrangements to a total for 1985 of 78. The last column in Table 7 shows that of the 78 responding towns that owned microcomputers, only 5 towns were owners at the end of 1981. Again, there was an increase in the number of towns purchasing microcomputers in each succeeding year to a total of 52 in 1985.

Table 6. MICROCOMPUTERS USED BY TOWNS, BY YEAR
OF PURCHASE OR FIRST USE AND BY 1980
TOWN POPULATION QUARTILES
91 New York Towns, 156 Microcomputers, Through 1985^{a/}

Year	Number of m/cs purchased or first used in these years by towns in: ^{b/}				Totals
	Quartile 1	Quartile 2	Quartile 3	Quartile 4	
Before 1982	0	0	2	4	6
1982	0	1	1	7	9
1983	1	2	6	10	19
1984	1	3	10	30	44
1985	<u>7</u>	<u>2</u>	<u>9</u>	<u>60</u>	<u>78</u>
Totals	9	8	28	111	156

^{a/} The data indicate year of purchase for town-owned microcomputers and year of first use for town purposes for machines used under other arrangements. Eleven microcomputers reported by 8 towns were not used to develop the table because dates were not reported or because the microcomputers were purchased in 1986, a year for which data comparable to those of preceding years could not be developed due to the timing of the survey.

^{b/} "M/cs" is an abbreviation for microcomputers.

The data for the towns of different sizes in the two tables indicate that this building of overall momentum was, in fact, mostly a phenomenon of the fourth quartile of towns and, to a much lesser extent, the third quartile of towns. Table 6 shows that for the towns of Quartile 4, there was a yearly increase in the number of microcomputers acquired or first used under other arrangements from 4 at the end of 1981 to 60 in 1985. Even though the general trend was also upward for the towns of Quartile 3, the figures are much less impressive, namely, from 2 at the end of 1981 to 9 in 1985. The figures from Table 7 for the towns of the third and fourth quartiles show the same patterns. On the other hand, the figures in the two tables for the towns of the first and second quartiles show no clear

Table 7. TOWNS PURCHASING MICROCOMPUTERS, BY YEAR OF PURCHASE AND 1980 TOWN POPULATION QUARTILES
78 New York Towns, Through 1985^{a/}

Year	<u>Number of towns purchasing m/cs in:</u> ^{b/}				Totals
	Quartile 1	Quartile 2	Quartile 3	Quartile 4	
Before 1982	0	0	2	3	5
1982	0	1	1	4	6
1983	0	0	2	8	10
1984	0	1	7	19	27
1985	<u>4</u>	<u>2</u>	<u>8</u>	<u>38</u>	<u>52</u>
Totals	4	4	20	72	100

^{a/} The data are for all 78 towns owning microcomputers that responded to the long-form survey. A number of towns in the third and fourth quartiles purchased microcomputers in more than one year; thus, the sum of the totals column is greater than 78. Eleven microcomputers reported by 8 towns were not used to develop the table because dates were not reported or because the microcomputers were purchased in 1986, a year for which data comparable to those of preceding years could not be developed due to the timing of the survey.

^{b/} "M/cs" is an abbreviation for microcomputers.

evidence of year-by-year increases in the pace of adoption of microcomputer technology. The data in the two tables for 1985 for the towns of the first quartile do suggest the beginning of a possible increase of importance, but more than this cannot be safely ventured.

The situation portrayed by these data for the towns of the first and second quartiles is consistent with informal reports to the researchers from vendors of financial management software systems for New York State local governments. In general, financial management applications seem to be among those that stimulate local governments to make an initial purchase of a microcomputer. But in 1984 and 1985 these vendors were reporting very few sales to smaller local governments.

How should those interested in providing to towns microcomputer hardware, software, and related services, including education and technical assistance, assess the situation portrayed by these data? A full discussion of this question is beyond the limits of this report, but some brief comments may serve to stimulate thought by others. First, these figures again emphasize the need for studies of the cost-effectiveness of microcomputers for smaller towns. Second, if these studies demonstrate that the technology is appropriate for these towns, as the researchers think they would, then a heavy emphasis by providers of education and technical assistance on helping them understand its usefulness to them and how to acquire and use it would seem to be in order. Third, this emphasis should precede or at least accompany the implementation of any technical assistance programs for these smaller towns that require that they be able to use their own microcomputers to connect to a telecommunications network or central data file. Fourth, software firms attempting to serve New York State's local governments should take a number of factors pertaining to their own particular situations into account in evaluating the data presented above. These factors include the adequacy of their current products for small jurisdictions, their capacity to modify, if necessary, their products or to develop new products to better meet the needs of smaller towns, the increased commitment to marketing that may be needed to generate sales to smaller towns, their willingness to take risks, and their need for a rapid return on investment. Finally, in general, the data seem to indicate that the towns of the fourth quartile constitute a smaller but more responsive market, while the towns of the other three quartiles represent a larger, virtually untapped market -- but a much more challenging one.

Microcomputer Equipment Reported by Towns

Tables 8 and 9 were created to answer a question frequently of interest to town officials and employees and others: "What brands of microcomputers are towns using?" The 99 towns that responded to the long-form survey reported use of microcomputers from 27 manufacturers, but there were only 5 of these companies whose microcomputers were reported 10 or more times. These manufacturers are specifically named in Tables 8 and 9. For responding towns as a whole, the dominant manufacturer was clearly IBM, as the researchers had expected. The final columns in the two tables show that 43 towns, which represented 43 percent of the 99 responding towns, had 68 IBM microcomputers, representing 41 percent of the 167 microcomputers for which long-form questionnaires were returned. The other manufacturers had significantly lower numbers and percentages. The tables also show that IBM had a similarly dominant position in the fourth quartile of towns. For the towns of the other three quartiles, the total numbers of microcomputers for which questionnaires were returned were too small and the distributions among manufacturers were too great to support any meaningful statements about dominant manufacturers.

IBM's dominance among New York towns using microcomputers parallels the dominance of this manufacturer on the national scene among county and city governments of more than 10,000 population. The 1985 survey of these governments sponsored by the International City Management Association found that 53 percent of the responding governments had IBM microcomputers. Each of the four next most popular systems (Hewlett-Packard, Burroughs, Apple and NCR, respectively) was used by 8 percent or less of the respondents.¹⁰

A matter of even more interest to the researchers than patterns of manufacturer dominance was to what extent the microcomputers used by towns represented one or more groups of "highly compatible" microcomputers. What this term means is a question that might be answered in a number of ways by knowledgeable parties. The definition employed here is the capacity of one microcomputer to run almost all of the software created specifically for another microcomputer or line of microcomputers.

Numerous sources of information were used to categorize the microcomputers for which long-form questionnaires were returned in terms of compatibility. These included the researchers own knowledge, other knowledgeable parties at Cornell, microcomputer

¹⁰Scoggins, Tidrich, and Auerbach, "Computer Use in Local Government," p. 3.

Table 8. TOWNS USING MICROCOMPUTERS OF DIFFERENT
MANUFACTURERS, BY 1980 TOWN
POPULATION QUARTILES
99 New York Towns, 167 Microcomputers, 1985-1986

Manufac- turer	Number of towns using manufacturer's m/cs in: ^{a/}				Totals
	Quartile 1	Quartile 2	Quartile 3	Quartile 4	
IBM	4	4	5	30	43
Sperry	0	0	2	5	7
Apple	1	1	5	1	8
Tandy/Radio Shack	4	1	4	4	13
Burroughs	0	0	0	4	4
Others ^{b/}	<u>2</u>	<u>3</u>	<u>7</u>	<u>23</u>	<u>35</u>
Totals	11	9	23	67	110 ^{c/}

^{a/} "M\cs" is an abbreviation for "microcomputers."

^{b/} There were 22 other brands of microcomputers.

^{c/} This total is greater than 99 because some towns in
Quartiles 3 and 4 used microcomputers from more than one
manufacturer.

books and periodicals, informed retailers of microcomputer hardware and software, the town personnel using particular machines, and, in a few cases, even microcomputer manufacturers. Given these many different sources of information and the varying definitions of compatibility, it is certainly possible that other persons would classify some microcomputers differently than they were classified for this report. But it seems extremely doubtful that these potential differences would alter the general picture that developed.

The IBM PC (the PC, the PC XT, and the PC AT models) and highly compatible machines constituted not only a large compatibility group, but also the only significant group of this nature among the towns responding to the long-form survey. As the last columns in Tables 10 and 11 indicate, two-thirds of the responding towns (65 of 99) were using 103 IBM PC and highly compatible microcomputers, representing approximately the same proportion (62 percent) of the 167 microcomputers of the

Table 9. MANUFACTURERS OF MICROCOMPUTERS USED BY
TOWNS, BY 1980 TOWN POPULATION QUARTILES
99 New York Towns, 167 Microcomputers, 1985-1986

Manufac- turer	Number of m/cs used by towns in: ^{a/}				Totals
	Quartile 1	Quartile 2	Quartile 3	Quartile 4	
IBM	4	4	5	55	68
Sperry	0	0	2	16	18
Apple	1	1	9	3	14
Tandy/Radio Shack	4	1	4	4	13
Burroughs	0	0	0	11	11
Others ^{b/}	<u>2</u>	<u>3</u>	<u>8</u>	<u>30</u>	<u>43</u>
Totals	11	9	28	119	167

^{a/} "M\cs" is an abbreviation for microcomputers.

^{b/} There were 22 other brands of microcomputers.

long-form survey. Only 14 highly compatible Apple microcomputers (the IIe and the II+) were reported, and these machines were used by only 8 towns. There were also 13 towns using 14 microcomputers with CP/M operating systems, but it seems likely that only a few of these machines were highly compatible. No other compatibility groups were identified.

What are the practical implications of the above data on manufacturer dominance and compatibility groups? First, the potential for microcomputer users to help one another through the exchange of information and experiences is greatly enhanced if they use the same or highly compatible microcomputers. These data indicate that only the IBM PC compatibility group provides a widespread basis for this type of support, whether done on an informal basis or through a formal arrangement. A further implication of the data is that if a town is interested in purchasing a microcomputer system and it believes that an important feature to consider is the potential to receive assistance from microcomputer users in other towns, than machines in the IBM PC compatibility group should definitely be considered. Second, providers of technical assistance and education to towns concerning the acquisition and use of microcomputers should find it possible to help many more towns

Table 10. TOWNS USING IBM PC AND HIGHLY COMPATIBLE
MICROCOMPUTERS, BY 1980 TOWN
POPULATION QUARTILES
65 New York Towns, 103 Microcomputers, 1985-1986

1980 town population quartiles	Number of towns in quartile using:		Totals
	IBM PC micro- computers ^{a/}	Highly compatible microcomputers	
1	2	1	3
2	4	0	4
3	5	4	9
4	<u>33</u>	<u>20</u>	<u>49^{b/}</u>
Totals	44	25	65 ^{b/}

^{a/} These figures are for the IBM PC, PC XT, and PC AT models.

^{b/} These totals differ from the sums of the figures in the two rows because four towns in Quartile 4 used both IBM PC and highly compatible microcomputers.

and to provide more in-depth assistance if they concentrate the great bulk of their resources on the IBM PC compatibility group. Thirdly, almost all of the microcomputer software created specifically for New York local governments with which the researchers are familiar is written for use with IBM PC and compatible microcomputers. To at least some extent, this programming emphasis may have helped create the dominance of these microcomputers. Whether or not this is the case, the data seem to indicate that a continued orientation towards the IBM PC compatibility group by these software developers is appropriate.

IBM's introduction in April 1987 of a new line of microcomputers (the Personal System/2) added a new measure of complexity to the microcomputer marketplace, but it does not appear that this negates the above conclusions. A detailed discussion of the ramifications of this development is beyond the limits and purposes of this report. The most relevant consideration for present purposes is that Personal System/2 machines run software created for the IBM PC machines, thus making these new microcomputers part of the group with which the above statements are concerned. A second relevant consideration is that it seems clear that versions of the earlier members of the IBM PC compatibility group and software that runs on

Table 11. IBM PC AND HIGHLY COMPATIBLE MICRO-
COMPUTERS USED BY TOWNS, BY 1980
TOWN POPULATION QUARTILES
65 New York Towns, 103 Microcomputers, 1985-1986

Towns in:	Number of:		Totals
	IBM PC micro-computers	Highly compatible microcomputers	
Quartile 1	2	1	3
Quartile 2	4	0	4
Quartile 3	5	5	10
Quartile 4	<u>53</u>	<u>33</u>	<u>86</u>
Totals	64	39	103

them, including products specifically designed for New York State local governments, will continue to be marketed, at the very least for the next few years. Thus, towns interested in purchasing microcomputer systems from this group will have to decide -- given their needs and financial resources -- whether these new members of the IBM PC compatibility group and any "clones" that are developed are better choices than the current models of the earlier members of the group.

A few other data and conclusions concerning the microcomputer equipment reported by the long-form respondents are noteworthy.

Most experienced microcomputer users would not consider a large proportion of the microcomputers reported by long-form respondents to be well-equipped for efficient and intensive use because of their lack of hard disks. These devices for the convenient storage and retrieval of software and large quantities of data were installed on only half (83) of the 167 microcomputers for which long-form questionnaires were returned. Sixty-six of the microcomputers with hard disks were used by towns of the fourth quartile, but even for this quartile only 55 percent of the microcomputers for which forms were returned (66 of 119) were equipped with hard disks.

Neither were the responding towns well-equipped for sending and receiving microcomputer data via telephone. Modems, the devices necessary for using microcomputers in this fashion, were reported for only 29 (17 percent) of the 167 microcomputers. Twenty-three of the 29 modems were reported by towns of the fourth quartile.

Printers from a considerable number of companies were used by the responding towns, but no one company accounted for a really significant proportion of the total. Printers from 27 companies were reported. The actual number of brands in use with the 153 microcomputers equipped with printers was probably even larger than 27, since the names of 21 printers were not reported. Only 5 trademarks were reported more than ten times each, and none of them accounted for more than 20 percent of the 132 printers that were specifically named. These manufacturers and the numbers of times their printers were reported were as follow: Epson, 25; Okidata, 20; IBM, 16; Radio Shack, 13; and NEC, 11.

Microcomputer Software Reported by Towns

The long-form questionnaire asked respondents to identify-- by type, program name, and publisher or other developer -- the software available for use with the particular microcomputer for which a form was being completed. A first set of software questions asked about specific types of commercial software packages (those developed for sale to many users) that are commonly purchased by microcomputer users. These included word processing, spreadsheet, database management, statistical, communications, and graphics packages. A second section of "open-ended questions" asked respondents about their commercial financial management packages. The blank spaces were intended to allow them to write in answers such as "general ledger package" and "accounts receivable package" from "ABC Software, Inc." Because of space limitations on the form and the many different types of financial management packages available, the researchers chose not to list these types specifically on the form. This same reasoning led to the use of the open-ended format with the third and fourth sections of software questions. The third section asked respondents to identify "other commercial software packages" available for use with the particular microcomputer. The fourth section asked respondents to identify any application for which software had been "developed specifically for your town" (custom software) and the developer of this software.

As the researchers expected, the great bulk of the software available for use with microcomputers being used for town purposes consisted of commercial packages rather than custom software. As the last columns of Tables 12 and 13 show, 28 (28 percent) of the 99 responding towns reported that custom software was available for use with 35 (21 percent) of the 167 microcomputers for which long-form questionnaires were returned.

In contrast, the corresponding numbers were much higher for each of the first four types of commercial software packages listed in the two tables, namely, word processing, spreadsheet, financial management, and database management packages. For example, 75 (76 percent) of the responding towns reported that word processing packages were available for 126 (75 percent) of the 167 microcomputers of the long-form survey. This overall pattern of much greater availability of commercial software packages also prevailed for the towns of each of the town population quartiles.

These data suggest that towns were tending to make prudent software investments. Paying for the development of a particular microcomputer software product for the buyer's exclusive use is almost always many times more expensive than the cost of a commercial package for the same application, since in the latter case the development costs are recovered from a great many purchasers rather than one. The commercial package also is generally of higher quality because it is likely to have been more thoroughly tested and because the greater economic rewards available to those creating successful commercial packages attract the best programming talent.¹¹

In addition, 7 of the 28 towns reporting custom software, representing 12 of the 35 machines for which it was available, indicated that this software had been created by town officials or employees. It was also clear in some instances -- and appeared quite probable in others -- that the custom software involved a complex application developed with an applications development tool, such as a spreadsheet package, rather than an application written in a programming language. This generally means a great savings in personnel time devoted to programming. Both of these factors also should have tended to minimize the cost of developing much of the custom software reported by the long-form respondents.

Tables 12 and 13 indicate that the commercial software reported by the long-form respondents forms two quite distinct "availability groups." Those commercial packages that were reported by numerous towns for numerous microcomputers are listed at the top of each of the two tables. These are word processing, spreadsheet, financial management, and database management packages. The least commonly available types of packages in this widely available group were financial management and database management packages; 50 towns reported 55 microcomputers with financial management packages, and 49 towns reported 70 machines with database management packages. The group of less widely available commercial software packages included graphics, communications, statistics, and all other packages. In contrast to the figures just cited, the most widely available type of

¹¹Most of these points are stated very well in James R. Griesemer, Microcomputers in Local Government (Washington, D.C.: International City Management Association, 1983), pp. 92-93.

package in this group -- graphics software -- was reported by only 19 towns for 25 microcomputers. Again, the same pattern prevailed for the towns of each of the town population quartiles.

Is there any useful advice for towns to be drawn from these data patterns? The answer is "Perhaps -- as long as a town's particular circumstances also receive due consideration."

Table 12. SOFTWARE REPORTED BY TOWNS USING
MICROCOMPUTERS, BY 1980 TOWN
POPULATION QUARTILES
99 New York Towns, 1985-1986

Types of software	Number of towns with this software in:				Totals
	Quartile 1	Quartile 2	Quartile 3	Quartile 4	
<u>Commercial packages</u>					
Word processing	10	6	16	43	75
Spreadsheet	9	6	12	37	64
Financial management	5	5	12	28	50
Database management	5	4	13	27	49
Graphics	1	0	4	14	19
Communications	2	1	2	11	16
Statistics	1	0	1	3	5
Other	2	1	1	15	19
<u>Custom Software^{a/}</u>	1	3	6	18	28

^{a/} "Custom software" means software developed specifically for a particular town, either by a town official or employee or by an outside party. Sophisticated applications developed with an applications development package, such as the Lotus 1-2-3 electronic spreadsheet, are included.

The most obvious and attractive interpretation of the above data is simply that the commercial software packages reported most often by the long-form respondents represent those most useful to towns. If this is correct, then they should be candidates for serious consideration by towns interested in an initial microcomputer purchase and in profiting from the experience of towns already using microcomputers. Similarly,

Table 13. SOFTWARE REPORTED FOR MICROCOMPUTERS
USED BY TOWNS, BY 1980 TOWN
POPULATION QUARTILES
99 New York Towns, 167 microcomputers, 1985-1986

99 New York Towns, 1977					
Types of software	Number of microcomputers with this software used by towns in:				Totals
	Quartile	Quartile	Quartile	Quartile	
	1	2	3	4	
<u>Commercial packages</u>					
Word processing	10	6	19	91	126
Spreadsheet	9	6	14	63	92
Financial management	5	5	13	32	55
Database management	5	4	15	46	70
Graphics	1	0	4	20	25
Communications	2	1	2	20	25
Statistics	1	0	1	3	5
Other	2	1	1	30	34
<u>Custom Software^{a/}</u>	1	3	6	25	35
Detailed specificational					

^{a/}"Custom software" means software developed specifically for a particular town, either by a town official or employee or by an outside party. Sophisticated applications developed with an applications development package, such as the Lotus 1-2-3 spreadsheet, are included.

they should be seriously considered for purchase by towns already using a microcomputer that lack one or more of these types of packages.

Another interpretation that is probably valid to some extent is that successful use of the more widely available commercial packages prepares their users and "whets their appetites" for subsequent acquisition and use of packages from the less widely available group. Where the number of users has been continuously expanding, as in the case of New York State towns, more of the former than of the latter will therefore have been acquired at any given time. For example, once a town microcomputer user has mastered a water billing package (a type of financial management package), this user may then decide to acquire a statistical package for analyzing water usage and revenue figures generated by use of the billing package. No matter to what extent this second interpretation may be valid, the practical implications for towns considering an initial microcomputer purchase would seem not to conflict with but simply extend the statement made above: consider acquiring the "top-tier" packages first and later consider whether one or more "lower-tier" packages are worthwhile additions. For towns already using the top-tier packages, the second part of this statement would seem to apply: consider whether one or more of the lower-tier packages are now worthwhile.

As noted above, these conclusions should be regarded as general guidelines that may or may not apply to a jurisdiction's particular circumstances. For example, the computer aptitudes of available personnel and a crucial problem that a microcomputer might help resolve could lead a town to conclude that the first software package it acquires should be from the "other" category of the lower-tier group. But if such special circumstances are not present, the software decisions made by numerous other towns may very well provide some "collective wisdom" from which a particular town may benefit.

The fact that word processing, spreadsheet, and database management packages are among the commercial software packages most widely reported for microcomputers used by towns means that towns conform for the most part to more general trends in purchases of software by microcomputer users. A recent article summarized these trends as follows:

.... up to now, as far as industry insiders are concerned, only three kinds of software sell hardware: word processors, spreadsheets, and database management systems.

True, thousands of different applications programs are available, from software that seizes the phone line so that two computers may communicate with each other cross-country

to sophisticated business graphics programs that create maps of marketing territories.

But by-and-large, when someone decides to actually put down the money for a PC, he's motivated by a desire to run one of the "Big Three" applications. Everything else comes later.¹²

The fact that financial management packages rank with these Big Three in terms of the software reported by the long-form respondents is noteworthy. Word processing, spreadsheet, and database management packages may be used by many different town offices for many different applications. Financial management packages, however, are quite narrowly focused software products. This is indicated by their names, such as general ledger package, water billing package, and accounts receivable package. In addition, they generally cost significantly more than most of the Big Three packages. Thus, their ranking in popularity with them seems to indicate that computerizing aspects of their financial operations is a very high priority among towns using microcomputers.

In terms of particular commercial software products (Wordstar, Lotus 1-2-3, etc.), the long-form respondents reported a wide array of packages with very little dominance by any of them. A total of 191 different commercial software products were reported as available for use with the 167 microcomputers of the long-form survey. In 57 instances, the products were not named. Thus, the total number of commercial software products available for use was almost certainly over 200. Only 6 of these products were reported as available for use on ten or more microcomputers, and even these 6 packages were not widely available.

Relevant figures relating to the above conclusions for the more widely available types of commercial software products (the top-tier packages of Tables 12 and 13) are as follows:

Word processing packages - Thirty-two different word processing packages were reported. Only Wordstar was reported for ten or more microcomputers. It was reported by 13 towns for 27 microcomputers.

Spreadsheet packages - Twenty-one different spreadsheet packages were reported. Only 2 were reported for ten or more microcomputers. Lotus 1-2-3 was reported by 23 towns for 26 microcomputers, and Multiplan was reported by 9 towns for 12 microcomputers.

¹²"Database Management: The Secret is Out," The Waldenbooks Computer Newslink, Vol. 1, Issue 3 (1987), pp. 1 and 11.

Financial management packages - Sixty-nine different packages were reported. No one package was reported for ten or more microcomputers.¹³

Database management packages - Twenty-two different packages were reported. Only dBase was reported for more than ten microcomputers. It was reported by 9 towns for 14 microcomputers.

Since there are various types of commercial financial management packages, the number of microcomputers for which these different types were reported may be of interest:

Payroll	29
General billing	28
Utility billing	15
Budget preparation	15
Accounts payable	12
Various others	21

This situation of substantial diversity in particular software products with little "market share" won by any one of them has both positive and negative implications for town microcomputer users and those providing software and technical and educational assistance to them. First, it may mean that there are many software products that serve town purposes satisfactorily; in other words, towns may have many good products from which to make choices, which should lessen the chances of buying unsatisfactory products. Second, town interests may be served to a certain degree by the apparent lack of one or a few clear leaders in the sale of financial management programs developed specifically for New York State local governments. This situation may promote competition in software development and pricing that gives towns more for their money. On the other hand, the small market shares of particular products create an undesirable situation for towns interested in providing microcomputer support to one another. The potential for such support is much greater when many microcomputer users who can

¹³Each "module" or "subsystem" of an integrated financial management "system" was counted as one "package" or "product" for these figures. For example, the MUNIS general ledger and the MUNIS budget preparation module were counted as two packages. Since the modules of a given system can be purchased separately or in various combinations, it seemed most logical to treat each of them as one software product. Various modules from 2 firms were reported ten or more times; MUNIS modules were reported 16 times, and RDA MicroBudget modules were reported 10 times. Credit is due in this instance to Donald F. Norris for his helpful clarification of terms. See Norris, Microcomputers and Local Government, p. 38.

easily communicate with one another have the same software packages. It is severely limited when only a few users, who may be difficult to identify and scattered over a wide expanse of territory, have the same software products. Similarly, providers of educational and technical assistance to town microcomputer users would be able to accomplish much more if there were a few dominant software products. Unless personnel resources are abundant -- which they are not, it is not practical to attempt to provide expert educational and technical assistance for use of a wide variety of software products.

What strategies could be pursued to offset, at least in part, these two disadvantages? At least two might prove worthwhile.

One would be for one organization or a combination of organizations that towns look to for assistance to recommend specific software products within categories of software that towns commonly purchase. For example, one such recommendation might be stated in this fashion: "If you want a spreadsheet package, buy either Brand X or Y." Each recommendation could be accompanied by a strong statement setting forth why a specific product was chosen and the reasons -- such as those stated above -- for promoting concentration in software usage among towns. Recommendations for certain types of software should not be made if, as in the case of financial management software developed specifically for towns, the recommendations might decrease desirable competition or otherwise work against town interests.

A second and complementary strategy would be for a technical assistance organization to develop and strongly promote materials for the use of a particular word processing package and particular software development packages. An example of such a program is the "Town Budget Worksheet" referred to earlier (see page 25 of this report). The creation and marketing at reasonable prices of a significant number of such materials, all useful to numerous towns and requiring the use of a specific word processing or software development package, could lead to a substantially broader base of town users of the specific package. In turn, this would enhance the potential for these users to support each other and to gain educational and technical assistance from an organization with special knowledge of a particular package.

One of the reasons for asking the long-form respondents to identify their custom software was the hope that arrangements could be developed for making available to many towns useful custom software products reported by individual towns. These arrangements might involve such tasks as documenting the software or improving the existing documentation; undertaking programming to improve the existing features of the software, to develop new features, or to make the software adaptable to the varying circumstances of towns; and negotiating reasonable compensation to the town that sponsored the original programming. An effort

to market the software to other towns would, of course, be necessary, also. These tasks could be undertaken by the Cornell Local Government Program or by other organizations involved in providing education and technical assistance to New York State local governments.

The custom software identified by the long-form respondents included a number of products that might be used to explore further the feasibility of this approach. Examples include spreadsheet applications for doing payroll calculations and producing budget reports, software for handling registrations for town recreation programs, various programs for assisting with assessments of property for real property taxes, a "comprehensive survey note reduction program with graphics and topographical mapping routines" for use by town planners and engineers, and a program for generating information on funds available for investment.

Town Microcomputer Applications

A major part of the long-form questionnaire asked respondents to identify the applications for which their towns were using microcomputers. This section of the survey included a checklist of 64 specific applications (for example, "payroll calculations") and broadly stated areas of applications (for example, "police department records and management"). Interspersed with the foregoing were 24 blank lines on which respondents could describe applications or areas of applications not specifically identified in the checklist (for example, two blank lines for describing "other street and highway applications"). By reviewing lists of applications developed by others and by drawing upon their own knowledge of local government operations, local government microcomputer use, and commercial software packages created specifically for local governments, the researchers attempted to include in the checklist the specific applications and areas of applications most likely to be reported by numerous towns. If, in fact, applications or areas of applications other than those included in the checklist were common, the ample number of blank lines were intended to allow them to emerge. The blank lines also were intended, of course, to provide space for the reporting of less common applications.

To facilitate the portrayal of the reported applications, the categories listed in Table 14 were developed. A number of the broadly stated areas of applications from the survey checklist appear in this list. In addition, numerous specific applications used in the checklist as well as those identified by respondents on the blank lines were combined. The rationale, of course, was to group applications that relate to a given local government service or functional area. For example, the "water supply" category in Table 14 combines four items under "water supply service" from the survey checklist, namely, "billing,"

"recording payments," "preparation of reports on payments, water quality tests, etc.", and any applications described on the two blank lines for the identification of "other water applications."

Most of these areas of applications are readily understandable by those familiar with local government operations, but a few are not and therefore need to be defined here. Definitions for these categories are as follows:

Central-staff financial management applications - These are financial management applications generally undertaken by central staff (elected and appointed) that pertain to all or at least many of a town's functions and service areas.¹⁴ Some examples from the survey form are budget preparation by a town budget officer, maintenance of the general ledger, payroll calculations, and preparation of monthly or quarterly financial reports for the town board. Not included in this category are financial management applications undertaken by specialized town staff to serve their particular functions or service areas -- for example, preparation of a proposed budget for a highway department by a town highway superintendent.

Central-staff word processing applications - This area of applications consists of word processing applications generally performed by central staff (elected and appointed) that involve town operations as a whole or that are commonly done by such persons on behalf of a number of particular town service and functional areas. Examples are the preparation and indexing of minutes for town board meetings, the development of union and other contracts, and the preparation of public notices concerning hearings, local legislation, and elections. Not included in this category are word processing applications undertaken by a specialized town office in pursuing its activities-- for example, the production of form letters from an assessor to real property owners.

Central-staff personnel management applications - This area of applications consists of personnel management applications undertaken by central staff (elected or appointed) for the town as a whole or at least for a

¹⁴"Central-staff" is a not completely satisfactory term, but is used here for lack of a better alternative. The term may seem especially inappropriate for small towns with very limited numbers of employees and officials. But even in these towns, some of these persons -- for example, the town supervisor and the town clerk -- do tasks for the town as a whole, while other officials, such as the assessors and the highway superintendent, serve much more specialized service and functional areas.

number of town offices or departments. Personnel applications undertaken solely within a particular department or service area (for example, personnel records for the town library) are not included.

Central-staff risk management applications - This area of applications comprises risk management applications, including those involving insurance, performed by central staff (elected or appointed) for the town as a whole or at least for a number of town departments or offices. Not included are risk management applications undertaken solely for a particular department or office -- for example, records of injuries to highway workers maintained by a town highway department.

Other major applications - At the end of the applications checklist were blank lines where respondents could describe applications that they had not checked or described previously and that they considered to be "major applications." This category includes the few applications described on those lines.

Respondents' answers indicating a service-specific or function-specific version of the central-staff applications defined above were not disregarded in creating Table 14. Rather, these applications were counted as appropriate in other areas of applications. For example, if a highway department employee checked "preparation of bid specifications" in the word processing section of the checklist, this response was counted as an application within the applications category of "streets and roads."

Table 14 shows that for the towns responding to the long-form questionnaire, only two areas of applications were really common, namely, central-staff financial management applications and central-staff word processing applications. The final column in Table 14 indicates that 61 (62 percent) of the 99 responding towns reported one or more central-staff financial management applications and 48 (48 percent) reported one or more central-staff word processing applications. In contrast, for the remaining sixteen areas of applications, the next highest number of towns was the 23 (23 percent) that reported one or more real property tax applications. In short, beyond the application categories of central-staff financial management and word processing, microcomputers were not commonly used for any applications category. The data for the towns of the four 1980 town population quartiles show approximately the same pattern for each of these groups of town.

The dominance of financial management and word processing applications for the responding towns is actually even greater than indicated by the data of Table 14. Numerous towns also reported that these types of applications were used by officers and employees other than central staff for the benefit of their

Table 14.

AREAS OF APPLICATIONS OF MICRO-
COMPUTERS USED BY TOWNS, BY 1980
TOWN POPULATION QUARTILES

99 New York Towns, 167 Microcomputers, 1985-1986

Areas of applications	Number of towns reporting one or more applications in this category in:				Totals
	Quartile 1	Quartile 2	Quartile 3	Quartile 4	
Central-staff financial management	8	6	14	33	61
Central-staff word processing	9	4	9	26	48
Real property tax	2	1	6	14	23
Water supply	0	2	4	13	19
Budget preparation by department heads	4	0	1	10	15
Streets and highways	1	1	2	10	14
Zoning, subdivision, & bldg. records	0	1	2	9	12
Sewage disposal	0	2	2	7	11
Parks & recreation	0	0	1	6	7
Justice court	0	0	2	4	6
Dog license records	1	0	4	0	5
Central-staff personnel management	2	0	0	3	5
Police	0	0	1	3	4
Library	0	0	1	2	3
Central-staff risk management	1	0	0	1	2
Garbage	0	0	0	2	2
Miscellaneous license & permit records	0	0	1	1	2
Other major applications	0	0	0	6	6

particular service or functional areas -- for example, for streets and roads, library, and parks and recreation services.

These patterns are consistent with the data discussed previously in this report concerning the types of software available for use with microcomputers used for town purposes. Both word processing and financial management packages were among the four types of commercial software packages most frequently reported by respondents to the long-form survey. In addition, the other two types of packages in this group, namely, spreadsheet and database management packages, may be used for financial management applications.

The above findings also are generally consistent with those of other studies of computer use by local governments. Donald Norris participated in a 1982 national survey of microcomputer use by cities and also in a 1983 study of use of computers of all types by smaller cities and counties in seven plains and mountain states. According to Norris, these two studies "found that micros in local governments were used primarily for word processing or for financial management."¹⁵ A national survey of computer use by city and county governments of more than 10,000 population was undertaken in 1985 by John Scoggins, Thomas Tidrich, and Jill Auerback for the International City Management Association (ICMA). This study found that spreadsheet and word processing applications, reported by 47 percent and 46 percent, respectively, of the responding local governments, were the two most frequently reported microcomputer applications. Beyond these two types of applications, one application was reported by 28 percent of the respondents, four were reported by 10 to 20 percent, and each of the remaining sixty-three was reported by less than 10 percent. Thus, extensive use of microcomputers for financial management applications was not apparent, although it could have been a very major proportion of the spreadsheet category. But 50 percent or more of the responding local governments used larger computers for each of six of the eight finance applications listed in the survey report, making finance the most frequently reported area of applications for all types

¹⁵Ibid., p. 37. The findings of the 1982 survey are reported in Donald J. Norris and Vincent J. Webb, "Microcomputers," Baseline Data Report, Vol. 15, No. 7 (Washington, D.C.: International City Management Association, July 1983). The findings of the 1983 survey are reported in Donald F. Norris and David R. DiMartino, Computers and Small Local Governments: A survey of Computing in the Plains and Mountain States (Omaha, Neb.: Center for Applied Urban Research, University of Nebraska at Omaha, August 1983). Another report on the latter survey is found in Donald F. Norris, "Computers and Small Local Governments: Uses and Users," Public Administration Review, Vol. 44, No. 1 (January 1984), pp. 70-78.

of computers.¹⁶ Thus, the local governments responding to the ICMA survey -- on the average, much larger governments than the New York State towns that completed the long-form questionnaires -- had also placed a high priority on computerizing financial management applications, although not with microcomputers.

Why have the microcomputer applications patterns for New York towns described above come about? Probably a number of factors have interacted to make central-staff financial management and word processing applications the most frequently reported categories of applications. One reason could be simply that, given the prices, quality, and "fit" with their needs of available software, most towns using microcomputers have seen central-staff financial management and word processing applications as those that would yield the highest initial payoffs and therefore sought to computerize them first. Part of this rationale could be that a number of these applications-- for example, maintenance of the general ledger and payroll preparation -- serve the whole organization and have been seen as having priority over applications serving specialized service and functional areas. Also, the central staff generally work most closely with the governing board, the ultimate controllers of the town purse strings. In some cases, this may have given them a significant advantage in pressing for acquisition of microcomputer systems for their use over persons in more specialized areas of town government who also want these systems.

A number of reasons can also be suggested to explain why word processing and financial management applications have become important applications generally (not just for central staff). In the case of general word processing applications, these possible reasons include the substantial volumes of work of many town offices that can be handled much better by use of word processing software than by use of a typewriter; the affordable prices of many microcomputer systems equipped to do word processing; the relative ease with which many of these packages may be learned and used; and the desire of many officials and employees to use this technology. In the case of financial management applications other than those of central staff, these reasons might include the important needs of many town offices to manage their particular finances; the availability of many affordable spreadsheet and database management packages that may be used to develop simple financial management applications without a great commitment of programming time and expense; the availability of a few types of specialized commercial packages (for example, water billing packages) that perform well and provide a good return on their relatively high prices due to such factors as savings in employee time and substantial improvements in the accuracy of databases and the ease with which they may be maintained and manipulated; and the affordable prices of many

¹⁶Scoggins, Tidrich, and Auerbach, "Computer Use in Local Government," pp. 6-7.

microcomputers that run these spreadsheet, database management, and specialized financial management packages.

A final point supported by the responses concerning microcomputer applications is that towns as a whole were still in the early stages of putting microcomputer technology to use at the time of the survey. In a previous section of this paper, it was reported that only 23 percent of the 705 towns responding to the short-form survey were using microcomputers. Table 14 indicates that only applications in two areas of applications were commonly reported. Moreover, even for those two categories, most of the respondents were not using their microcomputers for even half of the applications specifically described in the questionnaire checklist, nor did they describe many additional applications for these categories on the available blank lines. In short, even most of those towns using microcomputers were not yet using them for a large number of applications.

Degree of Satisfaction with Microcomputer Systems

The researchers were interested in the overall level of satisfaction of town officials and employees with the microcomputer systems used for town purposes. Thus, the section of the long-form questionnaire that asked respondents to identify their hardware and software ended with this question: "Overall, how satisfied are you with the hardware and software described above?" Respondents were asked to choose a number on a numerical scale of one to seven. On the scale, one was labeled "very dissatisfied," four was labeled "neutral," and seven was labeled "very satisfied." Two and three could be used to indicate degrees of dissatisfaction between "very dissatisfied" and "neutral," and five and six could be used to indicate degrees of satisfaction between "neutral" and "very satisfied."

Other studies have indicated that local government users of microcomputers are generally satisfied or even highly satisfied with their microcomputer systems. In summarizing his review of research on microcomputer use by local governments, Norris stated that "Most microcomputer users are satisfied with their systems, even though they also report frustrating aspects of microcomputer use."¹⁷ From his eight case studies of microcomputer use by city governments, Norris concluded that "User satisfaction was high, although users paid a price to achieve satisfaction. That price was expressed in terms of the time invested to learn the system and in initial user frustration."¹⁸ The ICMA 1985 national survey of computer use by cities and counties of over 10,000

¹⁷Norris, Microcomputers and Local Government, p. 6.

¹⁸Ibid., p. 106.

population found that 41 percent of the respondents who answered the question concerning satisfaction with their jurisdiction's microcomputer systems were "very satisfied" and 53 percent were "moderately satisfied."¹⁹ The authors of the survey report concluded that "Given all the problems experienced, this satisfaction is apparently a result of the utility and productivity achieved in spite of the problems."²⁰

The overall response to the long-form question concerning degree of satisfaction with microcomputer systems probably may be best described as ambiguous. Of those forms on which the question was answered, 83 percent provided answers indicating a satisfied rating, 12 percent provided a neutral response, and 5 percent provided responses indicating dissatisfaction. The question was answered, however, on only 104 of the questionnaires. In terms of the total number of questionnaires (167), 51 percent provided responses indicating satisfaction with the reported microcomputer systems, 7 percent provided neutral ratings, and 4 percent provided responses indicating dissatisfaction. Obviously, the large percentage of forms on which the question was not answered complicates interpreting the overall response to it.

Why the question was not answered on so many forms is not clear. Review of these questionnaires indicated that 12 reported on microcomputer systems that were purchased quite recently or that were not being used, and 11 described microcomputer systems that received only light use, that is, less than ten hours per month. Most or perhaps all of the respondents completing these forms may not have developed any sense of overall satisfaction. But this still leaves 40 forms on which respondents did not indicate their degree of satisfaction. In these cases, one can only guess at possible reasons for the lack of response to the question. Possibilities include completion of the questionnaire by persons who did not use the microcomputers or used them relatively little, a rush to complete the questionnaire that did not allow time for questions demanding some reflection on overall experience, and so many choices for satisfaction ratings that respondents concluded finer distinctions were wanted than they were prepared to make.

¹⁹Scoggins, Tidrich, and Auerbach, "Computer Use in Local Government," p. 13.

²⁰Ibid., p. 12. The quotation applies also to the satisfaction indicated by respondents with "central computer systems." For these systems, 58 percent of the respondents were "very satisfied" and 38 percent were "moderately satisfied." Ibid., pp. 12-13.

Adequacy of Training for Use of Microcomputer Systems

A number of those concerned with the effective use of microcomputers by local governments have assigned critical importance to training. Missouri Extension Specialist Jack Timmons noted in 1984 that achievement by local governments of the significant productivity gains that are potentially available to them from the use of microcomputers depended to a large extent upon their access to good microcomputer training.²¹ The 1985 ICMA national survey of computer use by counties and cities of over 10,000 population concluded that one of the major problems associated with computer use by local governments was inadequate training; 47 percent of those respondents who answered the survey question about problems with microcomputer technology indicated that inadequate training was a moderate or serious problem.²² On the basis of his eight case studies, Norris stated that "the most consistent finding from studies I conducted in 1985 and 1986 on the use of microcomputers was that training was the most important factor in effective micro use in local governments."²³

A question on the long-form questionnaire asked respondents about the training for use of the systems on which they were reporting. The question asked, "How would you characterize the training for use of this microcomputer and its software received by its operators?" Four possible answers were presented: nonexistent, inadequate, adequate, and excellent.

Table 15 indicates that inadequate training may be a significant problem for town microcomputer operators, especially those of smaller towns. The final column of Table 15 shows that the long-form respondents indicated that training had been inadequate or non-existent for the use of 65 (39 percent) of the 167 microcomputer systems that they reported. Moreover, for towns of each of the first three quartiles, these two answers were provided for more than 50 percent of the microcomputer systems. Even for towns of the fourth quartile, the training for use of 33 percent of the 119 systems reported was described as inadequate or non-existent.

²¹Jack T. Timmons, "Overview of Microcomputer Use in Local Government," unpublished overview paper presented at the Conference on Local Leadership and Rural Development, sponsored by the Organization for Economic Cooperation and Development and the United States Department of Agriculture, Washington, D.C., April 1984, pp. 9-10.

²²Scoggins, Tidrich, and Auerbach, "Computer Use in Local Government," pp. 11 and 14.

²³Norris, Microcomputers and Local Government, p. 85.

Table 15. ADEQUACY OF TRAINING FOR TOWN MICROCOMPUTER
USERS, BY 1980 TOWN POPULATION QUARTILES
99 New York Towns, 167 Microcomputers, 1985-1986

Quality of training	Numbers of these responses from towns in:				Totals
	Quartile 1	Quartile 2	Quartile 3	Quartile 4	
Non-existent	4	2	7	17	30
Inadequate	2	3	8	22	35
Adequate	2	2	9	49	62
Excellent	2	0	2	13	17
No response	<u>1</u>	<u>2</u>	<u>2</u>	<u>18</u>	<u>23</u>
Totals	11	9	28	119	167

These results are consistent with the researchers' expectations. Their conclusion that in terms of any reasonable standard, annual training expenditures by the overwhelming majority of local governments are almost always inadequate is one with which many knowledgeable local government officials would agree. Moreover, in times of financial stress, amounts previously allocated for training are usually among the first to be seriously cut or eliminated. "Financially stressed" is probably a term that the officials of a great number of towns would think appropriate for describing the financial circumstances of their jurisdictions during the 1980s.

It is possible, of course, to learn to use a microcomputer solely through such methods as studying instruction manuals, using tutorial diskettes, and trial-and-error methods, but the costs associated with these approaches may far outweigh any savings from little or no expenditures on formal training.²⁴ For

²⁴The question concerning training was intended to elicit answers about formal training. There was no indication on the long-form surveys that any of the respondents interpreted it more broadly. If, however, some of the respondents who indicated that the training was inadequate or non-existent interpreted the question as including other than formal training, this would simply add weight to the comments made above, since it would also indicate dissatisfaction with informal training approaches.

the expected operator, these costs may include unrealistic work loads, unproductive use of time, frustration, disenchantment with microcomputer technology, and even refusal to continue using a microcomputer. For a local government, the costs may include significant delays in realization of the benefits of using a microcomputer system, costly mistakes, such as erasing and even losing permanently significant data, and increases in resistance to microcomputer use among other town personnel who hear reports of frustration and difficulties. Perhaps most significant are the possibilities that an operator may never learn how to perform certain very valuable operations and may learn to do others in very inefficient ways or in ways that produce substantially less than optimal results.²⁵

Number of Operators
per Microcomputer

Another matter in which the researchers were interested was the number of persons operating the microcomputers used for town purposes "on a fairly regular basis." The researchers expected that most of these microcomputers would have only one or two users, and this proved to be the case. As indicated in Table 16, of the 167 microcomputers reported by long-form respondents, 65 (39 percent) were used regularly by a single person, and 37 (22 percent) were used regularly by two persons. The respondents also reported 20 (12 percent) used regularly by three persons, 11 (7 percent) used regularly by four persons, and 13 (8 percent) used regularly by five or more persons.²⁶

Contrary to what the researchers had expected, more persons shared the use of microcomputers in the towns of the fourth quartile than in the towns of the other three quartiles. Of the 48 microcomputers used by towns of the first, second, and third quartiles, only 2 (4 percent) were used regularly by three persons and the same number were used by four persons. None was used regularly by more than four persons. In contrast, of the 119 microcomputers for which towns of the fourth quartile returned long-form questionnaires, 18 (15 percent) were used regularly by three persons, 9 (8 percent) were used regularly by four persons, and 13 (11 percent) were used by five or more persons.

²⁵Norris makes a case very similar to the one presented in this paragraph. *Ibid.*, p. 85.

²⁶Of the 7 microcomputers for which no regular users were reported, 1 was purchased with defective software and the town was awaiting the writing of new software, 1 (an Osborne) had never been used, 2 had been purchased recently, and 3 were machines purchased a number of months before the survey that were not yet being used.

What could be some reasons for this greater sharing of microcomputers in the towns of the fourth quartile? The reasons could include larger pools of potential users in these larger towns; the greater needs of these towns to do the types of things that microcomputers are designed to do; the greater dispersal of officials and employees among widely separated work sites in the smaller towns (for example, a town highway garage located some distance from the town hall), making it more difficult for persons who work at these sites to share a given machine; and the greater percentage of smaller towns using microcomputers that had use arrangements other than town ownership (see Table 2), a good proportion of which might have involved a microcomputer located in an official or employee's home or non-town worksite.

Access to Expert Assistance

The long-form questionnaire asked survey respondents about the availability of certain types of expert assistance for use of the microcomputer systems on which they were reporting. Access to such assistance is one means of lessening the costs that may result from inadequate formal training as well as a way to help

Table 16. NUMBER OF REGULAR OPERATORS OF MICRO-COMPUTERS USED FOR TOWN PURPOSES
99 New York Towns, 167 Microcomputers, 1985-1986

Number of regular users	Number of microcomputers	Percent of total microcomputers
Zero	7	4.2
One	65	38.9
Two	37	22.1
Three	20	12.0
Four	11	6.6
Five or more	13	7.8
No response	<u>14</u>	<u>8.4</u>
Totals	167	100.0

those operators who have received significant formal training. The first part of the question asked respondents to indicate whether help for the use of their particular microcomputers was available from computer consultants retained on a continuing basis or from consultants paid only when their services were used ("paid when needed"). The second part of the question asked if an official or employee (who might have other duties as well) or a "citizen-volunteer" served as the town's "computer expert" for use of the particular microcomputer.

Unfortunately, the question was not stated clearly enough to produce all of the information that the researchers wanted. While 65 (39 percent) of the 167 long-form questionnaires indicated that an in-house computer expert was available, a significant number of these forms also included notations that this expert was really the operator of the particular microcomputer, that is, the person completing the questionnaire. It seemed likely that the responses indicating available in-home expert assistance on many more forms -- perhaps even a majority of the total of these answers -- should be interpreted the same way. In short, it was impossible to determine the extent to which the operators of the 167 microcomputers of the long-form survey could turn to more knowledgeable town officials or employees for assistance.

The data on the other types of available expert assistance show a predominance of arrangements that are probably the least helpful. As Table 17 indicates, consultants paid when needed were available for 21 (13 percent) of the 167 microcomputers, assistance from citizen-volunteers was available for 20 microcomputers (12 percent), and assistance from consultants retained on a continuing basis was available for 14 microcomputers (8 percent). It seems reasonable to think, other things being equal, that most microcomputer operators would call more frequently for assistance from a consultant retained on a continuing basis than from one paid when needed; they would tend to realize that all assistance from the former would be covered by one blanket charge while each instance of assistance from the latter would generate a specific charge. Similarly, most operators probably would tend not to call frequently upon citizen-volunteers for assistance because of an awareness that they could easily exhaust the volunteer's willingness to provide this contributed service.

Those operating microcomputers in the smaller towns of the first two quartiles had almost no access to external assistance, while microcomputer operators for the larger towns of the third and fourth quartiles were in a much better situation. Access to consultants was not reported for the operation of any of the 20 microcomputers of the towns of the first and second quartiles, and use of a citizen-volunteer was reported for the use of only

Table 17.

EXPERT ASSISTANCE FOR TOWN MICRO-
COMPUTER OPERATORS, BY 1980
TOWN POPULATION QUARTILES
99 New York Towns, 167 Microcomputers, 1985-1986

Type of assistance	Number of microcomputers for which this type of assistance was reported in towns of:				Totals
	Quartile 1	Quartile 2	Quartile 3	Quartile 4	
Citizen-volunteer	0	1	3	16	20
Consultant paid when needed	0	0	6	15	21
Consultant retained on continuing basis	0	0	1	13	14

one (5 percent) of these microcomputers. On the other hand, external assistance was available for the operation of 54 (37 percent) of the 147 microcomputers of the towns of the third and fourth quartiles.²⁷

There also appeared to be a significant difference in access to assistance from the two types of consultants between the towns of the third and fourth quartiles. The operators of 13 (11 percent) of the 119 fourth-quartile microcomputers had access to a retained consultant, but the operators of only 1 (4 percent) of the 28 third-quartile microcomputers had such access. Conversely, the operators of only 15 (13 percent) of the fourth-quartile machines had access to a consultant paid when needed, while the operators of 6 (21 percent) of the third-quartile microcomputers had access to this type of consultant. If, as argued above, access to a retained consultant is generally a better arrangement than access to one paid when needed, then the microcomputer operators for the towns of the fourth quartile were in a better position for getting assistance from consultants than those of the towns of the third quartile.

²⁷The figures for each quartile in Table 17 may be correctly summed for this interpretation because only one type of external assistance was reported for each microcomputer.

The researchers expected that smaller towns would make significantly greater use of expert assistance from citizen-volunteers, but this did not prove to be the case. Smaller jurisdictions are known for a greater tendency to rely upon the use of volunteers in the conduct of public business. But, as Table 17 shows, expert assistance from a citizen-volunteer was reported for none of the microcomputers of the towns of the first quartile and for only 1 (11 percent) of the 9 microcomputers of the towns of the second quartile. On the other hand, this type of assistance was reported for the operation of 3 (11 percent) of the 28 microcomputers of the third-quartile towns and for 16 (13 percent) of the 119 microcomputers of the fourth-quartile towns. Such data probably reflected a relative scarcity in rural areas of residents who were knowledgeable of microcomputer technology. It also might have reflected a tendency for the few residents with this knowledge in such areas not to have social, business, and political interactions with those involved in town government. The making of the arrangements for a person to serve as a volunteer expert may require that first a high level of confidence in her or his knowledge be established through such interactions.

Key Limitations Experienced with Microcomputer Systems

The long-form questionnaire asked respondents to indicate in their own words the "most important limitations or problems you have experienced in using this microcomputer." One or more limitations or problems were identified on 120 questionnaires, and these responses were grouped into 31 general answers.

Only two of these answers were given a significant number of times, namely, "need for training" and "inadequate software." The answer given most frequently -- 54 times -- was "need for training," thus providing additional evidence that this has been a serious problem for town microcomputer users. This was also the response given most frequently by the respondents from the towns of each of the 1980 town population quartiles (5 times for Quartile 1, 3 times for Quartile 2, 10 times for Quartile 3, and 36 times for Quartile 4). The second most frequently given answer -- 24 times -- was "inadequate software." The 21 responses of "poor software documentation" could be justifiably regarded as a more specific way of indicating that software was inadequate. Viewed in this way, the response of "inadequate software" was given 45 times. This was clearly a more serious problem for the larger towns; almost all of the 45 responses were from towns of the third and fourth quartiles -- 7 from the former and 36 from the latter. All of the other answers were given a significantly fewer number of times. For example, the next most frequently given answer, "lack of time to use or learn to use the microcomputer," was given 16 times.

Advice from Respondents to Other Local Governments

The final question asked on the long-form survey sought to tap the respondents' experiences with microcomputers. It asked, "Based on your jurisdiction's experience in acquiring and using this microcomputer, what is the single most important bit of advice you would give to a jurisdiction interested in acquiring a microcomputer?" The respondents were again allowed to provide answers in their own words. Responses to this question were provided by 106 respondents and grouped into 14 broadly stated answers.

Two-thirds of the responses were accounted for by only two categories of answers, and one of these categories accounted for the great bulk of the two-thirds. Fifty-four (51 percent) of the 106 answers provided advice relating to the processes of buying software or hardware or both.²⁸ These answers also constituted the most frequent category of responses from respondents of the towns of each of the 1980 town population quartiles. In addition, 20 answers (19 percent) provided advice relating to training. Answers relating to sources of advice constituted the next most frequent category of answers, but this category had only 7 answers (7 percent).

While the answers relating to the processes of selecting software or hardware or both were diverse, most of them provided summary versions of the microcomputer procurement process generally advocated by knowledgeable parties or emphasized certain aspects of this process.²⁹ This provides a strong confirmation from actual experiences of towns that a decision to follow the advice of the experts is a wise one. For example, one of the respondents summarized this process in the following words: "Do your own research, talk to others, determine what you want it to do, find software, then investigate hardware." Another respondent provided this summary version: "Go out with a list of things you want the computer to do. Find the programs you can get, then choose your computer. Don't buy the computer

²⁸Most knowledgeable parties agree that a single process should be followed for the selection of both the hardware and software of a single microcomputer system. In greatly simplified terms, this process recommends these steps: choose the tasks to be computerized, choose the software to do these tasks, and then select the microcomputer that will run this software. Different processes are needed, however, when a new software product or piece of hardware is to be added to an existing microcomputer system. This is why the term "processes" is used here.

²⁹Different persons state this process with different aspects, but these differences are variations on a common theme. Norris provides a very thorough statement of the process. See Ibid., pp. 59-79.

and then look for the programs and find out you can't get any that you need. That's what we did."

V. THE TOWN MICROCOMPUTER USE DATABASE

At the outset of this report, it was stated that one of the objectives of the town microcomputer use survey was to generate information that might serve as a basis for educational and technical assistance endeavors beyond those already begun. A key project that the researchers had in mind was the creation of a town microcomputer use database that could be used to provide a town with useful information on the use of this technology by other towns. For example, this database would enable a town interested in acquiring a microcomputer system for water service billings to determine the names of "other towns like us" that were doing computerized water billing. The inquiring town could then contact these other towns about their experiences with their particular hardware and software. The potential creation of this database had a significant influence on the design of the town microcomputer use survey. Thus, it seems appropriate to include here some discussion of the nature of this project, the key obstacle that has prevented its accomplishment, and the lessons that were learned.

The survey process was designed to provide both an indication of whether the concept of the database had significant appeal to town officials and -- on the assumption that it would -- information that could be used to construct it. The short-form survey provided an opportunity for town officials to indicate a priority for this project. Included among the different means of providing assistance to town governments for acquiring and using microcomputers that the short-form respondents were asked to rate was a "contact list of NYS local governments using particular hardware and software for particular applications." This was the best description that the researchers could formulate for conveying in a very brief space the central concept of the town microcomputer use database. Since the researchers hypothesized that the short-form respondents would rate this idea highly, they decided to send the short-form questionnaires to all towns rather than to just a sample. The short-form responses would then provide a much more complete list of towns using microcomputers from which to seek information useful for the database. Gathering this information was to be done by means of the long-form questionnaires, which were mailed to all towns that indicated on the short-form questionnaires that they were using microcomputers. The sections of this form on hardware, software, and applications were intended to generate this information as well as to provide data useful for other survey purposes.

The researchers realized, of course, that they would have to take a number of additional steps to create the database and stimulate its use by towns. One would be to organize the data by means of an appropriate database management software package so that it could be easily searched to answer questions from towns. This might require the implementation of an initial scheme for organizing the database and significant modifications over time to incorporate lessons learned by actually trying to use the database to respond to questions from towns. Towns would have to be made aware of the existence of the database. Announcements in newsletters and magazines for town audiences and at meetings of statewide local government associations as well as letters to towns would probably be appropriate ways of doing this. The means by which towns could gain access to the database would have to be decided. Telephone calls to those in charge of the database would seem to be one obvious method, but the managers of the database might find it much easier to use the database to respond if town officials had received some guidance in formulating their questions before calling. Thus, constructing a form to provide this guidance and distributing it to town officials might be in order. This form could be distributed in the same ways that the availability of the database was made known to towns -- for example, as an enclosure to an association newsletter providing a description of the database.

The database would have to be updated periodically. Doing this would provide information on the changes in microcomputer use made by towns already included in the database as well as information for towns that had recently acquired their initial microcomputer systems. Thus, periodic surveys would be needed.

The researchers' expectation that the concept of a town microcomputer use database would have substantial appeal to town officials proved correct. As noted in an earlier section of this report, the "contact list" -- the researchers' description of the database concept -- received the second highest rating of the six specific means of assistance that short-form respondents were asked to rate.

Unfortunately, thus far it has not been possible to undertake the steps necessary to create and maintain this database and make it available for use by towns. The long-form survey generated information on the use of microcomputers by 99 towns, approximately half of those that were estimated to be directly using microcomputers at the time of the survey. This information was sufficient for continuing with the database project with the expectation that information from a much higher percentage of towns using microcomputers could be gathered later. Unfortunately, during the analysis of the survey data, the Local Government Program suffered a major loss of personnel resources that thus far has made it impossible to make the database

operational and maintain it. Attempts have been made to find grant monies to fund work on the database project as well as others that would help New York State local governments better use microcomputer technology. But these efforts have not yet been successful.

Significant progress was made, however, that could facilitate further work on a town microcomputer use database.

First, it is clear that the concept of the database has considerable appeal to town officials and employees. This was shown by the high overall rating that it received from the short-form respondents as a means for assisting their towns acquire and use microcomputers. It should not be necessary to prove the appeal of the concept again.

Second, the data on microcomputer use for those towns that responded to the long-form survey could prove useful for constructing a pilot version of the database. A small group of experienced town officials could be recruited to serve in an advisory capacity for this pilot effort. Given the support for the concept indicated by the short-form survey, legitimate assurances could be given to these officials that they would be investing their time in a project with broad appeal to their colleagues in town government.

Third, the list of towns using microcomputers that was generated by the short-form survey could prove useful for another effort to create the database. The great majority of these towns almost certainly will continue to use microcomputers. Thus, it would be worthwhile to check for their names among the initial respondents to any future effort to generate current information for a town microcomputer use database and to give special attention in follow-up correspondence and telephone calls to those who did not respond initially.

Fourth, lessons were learned from the two surveys concerning the length and nature of questionnaires for gathering data for a town microcomputer use database. The rate of response to the short-form survey was significantly greater than to the long-form survey. To a large extent, this was probably because town officials and employees judged that the one-page short-form questionnaire could be completed in a few minutes and that completion of the multi-page long-form questionnaire would take many times longer. Field-testing of the latter form indicated that this was not so, and this was stated in a cover letter, but probably to little avail. The greater length of the long-form questionnaire was due in good part to the researchers' attempt to use one instrument to serve three partially overlapping purposes. In sum, this experience seems to indicate, first, that any survey questionnaire used in the future to gather information for a town microcomputer use database should be as brief as possible -- no more than two pages. Second, it seems to indicate that use of the survey instrument to gather information for purposes other

than the construction and maintenance of the database should not interfere with this primary purpose.

These lessons deserve special emphasis because of the periodic need to ask town officials and employees to complete a questionnaire to provide information for updating the database. Any strategy that reduced the need for second and third requests for current data would pay dividends each time the updating was done.

APPENDIX A:

THE SHORT-FORM QUESTIONNAIRE

TOWN MICROCOMPUTER USE SURVEY

1. Does your town (check all that apply):

- a) ☐ Not own or use a microcomputer?
 b) ☐ Own 1 or more microcomputers? How many? _____
 c) ☐ Own 1 or more microcomputers with another government(s)?
 d) ☐ Have another microcomputer use arrangement?
 e) ☐ Use other types of computers (owned by your town, a service bureau, a county government, etc.) If so, please indicate: Model name and number _____ Owner _____ Applications (example: payroll, tax rolls) _____

2. If you checked b, c, or d, the most knowledgeable person to contact about your town's microcomputer use is:
 Name _____ Title _____
 Address _____
 Zip _____ Telephone _____

3. Do you anticipate acquiring a microcomputer (or another microcomputer) within the next two years? _____ No _____ Yes

4. What assistance would be best for your government for acquiring and/or using microcomputers? Use numbers to indicate as many priorities as you wish. 1 = highest.

- a) ☐ Introductory microcomputer training sessions. If this is a priority, when should the training be provided? Check one answer:
 ☐ Weekdays ☐ Saturdays
 ☐ Evenings ☐ State association meetings
 b) ☐ Self-study materials on initial acquisition and use of microcomputers.
 c) ☐ Microcomputer fairs (vendor shows).
 d) ☐ Contact list of NYS local governments using particular hardware and software for particular applications.
 e) ☐ Microcomputer consulting.
 f) ☐ Written instructions for using software programs to accomplish common applications (such as Lotus 1-2-3 for developing an annual budget).
 g) ☐ Other (please describe): _____

5. Does your town have a supervisor, comptroller, town manager, etc., who functions as a two-thirds to full-time "general town manager" (gathering information for important decisions, preparing and administering budgets and other plans, overseeing department heads, etc.,)?
 ☐ No ☐ Yes

THIS SURVEY COMPLETED BY: Name _____ Address _____
 Title _____ Zip _____
 Telephone _____

APPENDIX B:

THE LONG-FORM QUESTIONNAIRE

(Note: The size of the print for this survey form has been reduced from the original to facilitate inclusion here.)

TOWN GOVERNMENT MICROCOMPUTER SURVEY

A. IDENTIFICATION

Your name: _____ Title: _____ Town: _____
 Address: _____ Zip: _____ Tel: _____

B. MICROCOMPUTER DESCRIPTION: Complete this form for one microcomputer only. (Use additional copies for other microcomputers used by your jurisdiction.)

Manufacturer: _____ Model (example: PC XT): _____ Random Access Memory size: _____
 Date of acquisition (or first use, if not owned by town) _____ Month, _____ Year _____

C. HARDWARE AND SOFTWARE CHECKLISTS: Please circle "No" or "Yes" to indicate the hardware and software you have, give the other information requested, and circle a number to indicate your degree of satisfaction.

NOTE: If you have insufficient experience with a particular hardware or software item to indicate a degree of satisfaction, write "INSUF" after the name of the manufacturer or publisher and circle "4".

HARDWARE CHECKLIST

Do you have:

1. Hard disk? NO YES
2. Telephone modem? NO YES
3. Serial port (for use with modem)? NO YES
4. Printer? NO YES

Other expansion boards or equipment (please list):

5. _____
6. _____
7. _____

Product name and manufacturer

1	2	3	4	5	6	7
1	2	3	4	5	6	7
1	2	3	4	5	6	7
1	2	3	4	5	6	7
1	2	3	4	5	6	7
1	2	3	4	5	6	7
1	2	3	4	5	6	7
1	2	3	4	5	6	7
1	2	3	4	5	6	7
1	2	3	4	5	6	7

Very dissatisfied
 Neutral
 Very satisfied

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Commercial software checklist (Programs sold to many users)		Program name and publisher								
Do you have:										
8.	Word processing program?	NO	YES	1	2	3	4	5	6	7
9.	Spreadsheet program?	NO	YES	1	2	3	4	5	6	7
10.	Data base manager?	NO	YES	1	2	3	4	5	6	7
11.	Statistical program?	NO	YES	1	2	3	4	5	6	7
12.	Communications package?	NO	YES	1	2	3	4	5	6	7
13.	Graphics package?	NO	YES	1	2	3	4	5	6	7
Financial management programs, such as general ledger, budget preparation, utility billing, payroll, etc.? (Please list.)										
14.				1	2	3	4	5	6	7
15.				1	2	3	4	5	6	7
16.				1	2	3	4	5	6	7
17.				1	2	3	4	5	6	7
18.				1	2	3	4	5	6	7
19.				1	2	3	4	5	6	7
20.				1	2	3	4	5	6	7
Other commercial software packages? (Please list.)										
21.				1	2	3	4	5	6	7
22.				1	2	3	4	5	6	7
23.				1	2	3	4	5	6	7
Do you use any software developed specifically for your town? If so, please indicate the application, the developer, and your satisfaction.										
24.				1	2	3	4	5	6	7
25.				1	2	3	4	5	6	7
26.				1	2	3	4	5	6	7
27.	Overall, how satisfied are you with the hardware and software described above?			1	2	3	4	5	6	7

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D. APPLICATIONS CHECKLIST: Check the applications (tasks) for which this microcomputer is currently used, and make your best estimate of the number of hours per month the microcomputer is used for each task.

Notes: Include the time the printer runs even if no one is working at the microcomputer.

For applications not done monthly, convert the hours to a monthly basis (ex: 21 quarterly hours for water billings = $21 \div 3$ months = 7 hours monthly).

Use the same format on blank sheets of paper if you need more space to describe your applications.

Applications		Monthly hours
Real property assessments and taxes:		
1	Maintenance of parcel information	
2	Establishing assessed values	
3	Printing assessment and tax rolls	
4	Printing tax bills	
5	Tax collection	
6	Other real property tax applications (please identify):	
7		
Streets and highways:		
8	Project design (example: road construction)	
9	Project scheduling	
10	Project cost and time records	
11	Records on characteristics and conditions of streets, highways, etc.	
12	Routing of snowplows	
13	Equipment maintenance records	
14	Equipment maintenance scheduling	
15	Parts and equipment inventories	
16	Other street and highway applications (please identify):	
17		
Water supply service:		
18	Billing	
19	Recording payments	
20	Preparation of reports on payments, water quality tests, etc.	
21	Other water applications (please identify):	
22		
Sewer service:		
23	Billing	
24	Recording payments	
25	Preparation of reports on payments, effluent tests, etc.	
26	Other sewer applications (please identify):	
27		
Garbage collection and disposal:		
28	Billing	
29	Recording payments	
30	Routing of trucks	
31	Preparation of reports	
32	Other garbage applications (please identify):	
33		

(Go to top right of this page.)

(Go to next page)

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<u>Applications</u>		<u>Monthly</u> <u>hours</u>
License and permit records and management:		
34	Zoning	_____
35	Subdivision	_____
36	Buildings	_____
37	Dogs	_____
Other licenses and permits (please identify):		
38	_____	_____
39	_____	_____
Various other uses:		
40	Police department records and management	_____
41	Justice court records and management	_____
42	Parks and recreation records and management	_____
43	Library records and management	_____
44	Persomel records and management (ex: accrued vacation time, calculating salary increases)	_____
45	Insurance and other risk management records (ex: workers' comp., property values and losses)	_____
Accounting and financial management (hours not reported for other applications):		
46	Budget preparation by department heads (ex: highway superintendent)	_____
47	Budget preparation by budget officer	_____
48	General ledger	_____
49	Purchase orders	_____
50	Accounts payable	_____
(Go to top right of this page)		
<u>Applications</u>		<u>Monthly</u> <u>hours</u>
51	Check-printing, accounts payable	_____
52	Accounts receivable	_____
53	Cash receipts	_____
54	Cash management	_____
55	Payroll calculations	_____
56	Payroll check-printing	_____
57	Payroll reports (federal, state, etc.)	_____
58	Fixed asset accounting	_____
59	Monthly or quarterly financial reports	_____
60	Legally required annual financial reports	_____
Other accounting and financial management applications (please identify):		_____
61	_____	_____
62	_____	_____
63	_____	_____
Word Processing		
64	Maintenance of membership lists of appointed boards and committees	_____
65	Preparation of agenda for meetings, hearings, etc.	_____
66	Preparation of minutes for boards, committees, etc.	_____
67	Indexing of minutes	_____
68	Preparation of proposed local legislation (includes resolutions, ordinances, and local laws)	_____
69	Status of proposed local legislation (ex: notice published, hearing scheduled)	_____
(Go to next page)		

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<u>Applications</u>		<u>Monthly hours</u>	<u>Applications</u>	<u>Monthly hours</u>
<u>Word Processing (continued)</u>				
70	Preparation of public notices to be posted or published	_____	80	_____
71	Master record of approved local legislation	_____	81	_____
72	Indexing of approved local legislation	_____	82	_____
73	Maintenance of mailing lists and production of mailing labels	_____	Other major applications that you have not checked or described on pages 3-5 (please identify):	
74	Production of form letters	_____	83	_____
75	Preparation of bid specifications	_____	84	_____
76	Development of union contracts	_____	85	_____
77	Development of other contracts	_____	86	_____
78	Production of reports for town boards, state agencies, etc.	_____	87	_____
79	General typing and filing	_____	88	_____
(Go to top right of this page.)		_____	89	Other minor applications (simply check and estimate total monthly hours--no listing required).

E. OTHER QUESTIONS

1. Which three of the applications described in the previous section provide your jurisdiction the greatest benefit? (Please list in order of importance.)

No. 1 _____ No. 2 _____ No. 3 _____

2. Has your jurisdiction developed any unique applications for use with this microcomputer that you think would be of value to other local governments? If so, please identify them here:

3. How many persons use this microcomputer on a fairly regular basis? _____

4. How would you characterize the training for use of this microcomputer and its software received by its operators?

Non-existent _____ Inadequate _____ Adequate _____ Excellent _____

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5. Does your town have a paid computer consultant for helping with the use of this microcomputer?
 ___ No ___ Yes, retained on a continuing basis ___ Yes, paid when needed
 If "No," does your town have an official or employee (may have other duties) or citizen-volunteer
 who functions as your "computer expert" for use of this microcomputer?
 ___ No ___ Yes, an official or employee ___ Yes, a citizen-volunteer
6. What are the most important limitations or problems you have experienced in using this microcomputer
 (inadequate software, poor software documentation, cabling problems, need for training, etc.)?

7. What is likely to be the next major change in the use of this microcomputer (new hardware or software,
 another computer, etc.)?

8. Based on your jurisdiction's experience in acquiring and using this microcomputer, what is the single
 most important bit of advice you would give to a jurisdiction interested in acquiring a microcomputer?

9. If you wish to provide other information or comments, please do so here: _____

PLEASE RETURN COMPLETED QUESTIONNAIRE TO:

Local Government Program
 Department of Agricultural Economics
 313 Warren Hall
 Cornell University
 Ithaca, NY 14853-7801

THANK YOU FOR YOUR ASSISTANCE!!

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